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CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICE—
Second Annual Meeting of the Texas Gas and Electric Light Association..... 565

EDITORIALS—
Briefly Told..... 565
Death of Mr. William D. Griswold—A Just Decision—Notes.
Twelfth Annual Meeting of the Ohio Gas Light Association—Official Report—Revised by the Secretary—Concluded from page 536..... 566
Second Day, Morning Session—Discussion on Mr. Doherty's Paper on Selling Gas—A Special Train for the Western's Meeting—An Acknowledgment from Mr. Slater—Second Day, Afternoon Session—Some Queries from the Question Box—Ventilation of Gas Heated Rooms, by Mr. Donald McDonald—Discussion—Finishing the Question Box—Report of Committee on Next Place of Meeting—Report of Committee on Memorials—Election of Officers—Votes of Thanks.
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 573
Contract for Mr. Weber—Report of Allegheny County (Pa.) Gas Inspector—Increasing an Assessment—Cheaper Gas for South Bend, Ind.—Mr. Tracy Purchases the Salina (Kas.) Plant—To Improve the Carbondale (Pa.) Works—The Quality of Minneapolis Gas—The Montreal Company's Contract is Valid—A Hint from Meridian, Miss.—Something More from Montreal—The Weiskittel Agency in New York—Mayor Warwick on the Value of the Phila. Gas Plant—Contract for the U. G. I. Company—And Many Other Items.
Coke Breeze Concrete..... 578
The Market for Gas Securities..... 579

[OFFICIAL NOTICE.]

Second Annual Meeting of the Texas Gas and Electric Light Association.

OFFICE OF SECRETARY, GONZALES, TEX., March 28, 1896.

The following is a partial list of papers prepared for our second annual meeting, which will be held at Dallas, Tuesday and Wednesday, May 12 and 13, 1896:

"Electric Light Companies and their Consumers," by Mr. L. T. Fuller, of Calvert.

"Fixed and Variable Expenses in Manufacturing Plants," by Mr. Thos. D. Miller, of Dallas.

"Our Association," by Mr. A. E. Judge, of Tyler.

It is understood that Mr. Bauer, of Texarkana, Mr. Cullinane, of Denison, and Mr. Lord, of Fort Worth, will have short papers.

Such papers as are forwarded to the Secretary 20 days before the meeting will be printed (in sheet form) and a copy mailed to each member.

The "Question Box" is open to all, and will be quite a feature.

The question of a "Wrinkle Department" (among other matters) will come up, and it is expected that all who have originated, adapted or adopted some useful method or device will come prepared to tell about it.

The meeting will be called to order promptly at 10 A.M., Tuesday, May 12.

The names of the following gentlemen as Committee of Arrangements, Thos. D. Miller, H. L. Monroe, J. C. Lord, are guarantees that nothing will be left undone for the comfort and convenience of members and visitors. This Committee will make all necessary arrangements as to details of programme for both days, secure headquarters, look after hotel rates, etc. HOMER W. STARR, Sec'y.

BRIEFLY TOLD.

DEATH OF MR. WILLIAM D. GRISWOLD.—We regret to report the death of Mr. William D. Griswold, who passed away, on the evening of March 30th, at his home in St. Louis, at the ripe age of 81. Although not widely known to the gas fraternity, he was nevertheless for many years directly connected with the industry through his ownership of the East St. Louis Gas Works, which place is a flourishing town in St. Clair county, Illinois, on the Mississippi river, just opposite St. Louis, Mo. Deceased was born in Benson, Rutland county, Vermont, March 18th, 1815, and in due time graduated from the Middlebury (Vt.) Congregational College. A well-trained mind and plenty of pluck were his main possessions when he decided to take his turn at fortune in the West, and, in 1838, he located in Terre Haute, Ind., where for a time he taught school, meanwhile teaching himself the rudiments of law. In 1839 he entered into a law partnership with John P. Usher, and followed, with much success, for several years, the practice of the law. His pleading brought him in close connection with capitalists interested in Western railroad development, and in 1852 his first attempt at practical railroading was made, in the construction of the Evansville and Crawfordsville Road, which corporation he managed until he assumed charge of the Eastern division of the Ohio and Mississippi road, which division extended from Vincennes, Ind., to Cincinnati. In 1859 he was chosen President of the St. Louis, Alton & Terre Haute Company (since absorbed into the "Big Four" system), and in 1864 he was called to the Presidency and active management of the consolidation which resulted in the greater Ohio & Mississippi Railroad. In 1871 he retired from active business, although his estate was of a nature and value sufficient to keep him employed in its conservation. As said before, he was the proprietor of the East St. Louis Gas Works, and his interest in its success and growth was pronounced. His widow (formerly Miss Maria Lancaster, of Taylorsville, Ky.) survives him, in her 75th year, as do a daughter and son—the latter (Mr. J. L. Griswold)—is proprietor of the Laclede Hotel, St. Louis. Interment was made at Terre Haute, Ind., on the 2d inst. Deceased was noted for his charities, and for his hearty, whole-souled ways.—M.

A JUST DECISION.—Those who followed our mention, last fall and this winter, of the unfair crusade carried on by the local authorities of Memphis, Tenn., against the local gas companies, respecting the rates that might be charged by them for the gas supplied to the city and the residents, will be interested enough likely to hail with satisfaction the news that, in the first fair legal encounter over the rate ordinance adopted by the Council, the gas men have been sustained in their contention. To put it as briefly as possible, the local authorities promulgated an ordinance directing that gas should be supplied at a rate not in excess of $1.50 per 1,000—under the State law the authorities might name a rate not lower than $1.50, provided it could be shown that such rate was a reasonable one—and the Companies contended that the rate was unreasonable, in that they could not supply gas at less than $1.75, and meet their honest obligations to their workmen and to their security holders. A date was fixed by the authorities specifying when the ordinance should become effective, and the Companies, on that date, in making out their bills, rendered the same at $1.75, instead of $1.50. The authorities and the Companies accordingly came into conflict, with the result that the latter appealed to the Courts for an injunction restraining the city (the ordinance contained a misdemeanor clause under which the Companies could be fined for attempting to collect a greater sum than that allowable under the ordinance) from enforcing the penalties stipulation, prior to a merits' trial of the "reasonableness" of the figure named on behalf of the city. The injunction proceedings were heard before Judge Clark, of Chattanooga, Federal Court Judge for the Tennessee district, who, in a lengthy opinion delivered towards the close of last month, declared that the Company had the right to charge and collect for gas supplied at a rate in excess of $1.50 per 1,000 cubic feet, until it had been judicially determined that the $1.50 rate was a reasonable one. The opinion is given complete in the issue of the Memphis *Evening Scimitar* for March 20th, and it is well worth a close reading; for it bristles with matter that is notably commonsense. We hope to give it in full in our next issue, and right here we reproduce the following sentences from it as samples of the honest conclusions with which it abounds:

"Such investigation and such regulation as are contemplated by the statute might enable the Company to fix the price at $1.50 per 1,000 feet, or at any named figure between that and the former price of $1.75 per 1,000 feet. This would depend on the reasonableness of the regulation in the sense above explained, keeping constantly in mind that the power to regulate rates is not a power to destroy, and that limitation is not the equivalent of confiscation."

NOTES.—Mr. Henry C. Rew writes us that gas was turned into the holders of the Missouri Gas Company, of Kansas City, Mo., on the 31st of March. He says that the Company has every reason to be satisfied with the outlook.——Messrs. Cooke & Co., who have represented the P. H. & F. M. Roots Company, of Connersville, Ind., as their Selling Agents in the East for many years, have formally surrendered the representing. The Messrs. Roots have named Mr. J. B. Stewart to take charge of their own New York branch; and Mr. Stewart's headquarters are in 109 Liberty street, where any information respecting the Roots Company goods will be given. Of course, Messrs. Cooke & Co. will not turn a "bad ear" to an inquirer for the Roots goods; they simply retired from their agency because Mr. Johnston, of the Roots Company, thought Connersville should be directly represented in this city. ——Mr. Emile Ruff, Supt. of the Rochester (Minn.) Light and Fuel Company, writes that the Company's business shows a satisfactory increase, notwithstanding the peculiar environments of the place, one of which is that Rochester operates a municipal electric light plant, and distributes therefrom a 16-candle power incandescent lamp at the rate of ½ cent per hour. The city also maintains full candle power arcs, on a table calling for lighting between dusk and 9 P.M., at $4 each per month; or $5 each for a service lasting from dusk to 11 P.M. The increase in the Gas Company's business, comparing Feb., 1896, with Feb., 1895, amounted to 25 per cent.——Manager Leach, of the Taunton (Mass.) Company, proposes to do more this year than to extend the main system, for his Directors have empowered him to institute and order an amended selling rate. Under the new schedule, which is to take effect July 1st, ordinary consumers are to receive their supply for $1.35 per 1,000 cubic feet, and those who use 125,000 cubic feet or over per quarter will pay therefor $1.25 per 1,000. This is a voluntary concession all-round of 15 cents per 1,000.——At the annual meeting of the Knoxville (Tenn.) Gas Light Company the officers chosen were: Directors, Messrs. J. Y. Johnston, W. P. Washburn, John E. Hood, E. H. Saunders, A. D. Leach, John L. Rhea and R. R. Swepson; President, R. R. Swepson; Vice-President, A. D. Leach; Secretary and Treasurer, E. H. Saunders.

[OFFICIAL REPORT—REVISED BY THE SECRETARY—CONCLUDED FROM PAGE 536.]

TWELFTH ANNUAL MEETING OF THE OHIO GAS LIGHT ASSOCIATION.

HELD AT THE GRAND HOTEL, CINCINNATI, O., March 18 and 19, 1896.

SECOND DAY—MORNING SESSION.

Discussion on Mr. Doherty's Paper.[1]

Having finished reading the paper, Mr. Doherty further said: With reference to the last paragraph of my paper, relating to a support inside, I wrote Mr. Eilbeck several months ago about it, but did not receive any reply until about two weeks ago. He said then he would send us some chimneys to test, that were provided with a device to prevent the chimney from falling in on the mantle. I think that if some device or arrangement could be made, which will save the mantles when the chimneys break, it would cut down the expense of the Welsbach burner fully 50 per cent. This paper has been prepared very hastily, and I had no opportunity of correcting the proof before it was printed. There are, therefore, some inaccuracies which might have been obviated if I had had more time for its preparation and revision.

The President—The paper just read is one of a great deal of interest to all and contains a great many suggestions which are worthy of thorough discussion.

Mr. Doherty—I think an important point in reference to the sale of the Welsbach burner is that it should be placed in the hands, as far as possible, of the gas companies themselves; but if it is to be placed in the hands of people who have no interest in the light, or in its success, except the dollars and cents they are going to make out of the sale of the burner, there is no doubt that the future of the Welsbach burner will not be attended with as much success as if the exclusive sale were placed in the hands of the companies which furnish the light.

Mr. Templeton—I would like to ask Mr. Doherty in regard to the percentage of breakage in the Welsbach burners.

Mr. Doherty—Much of the breakage in the Welsbach burners is occasioned by the chimney falling in on the mantle. Changing the chimney so often (the chimney breaking and falling in on the mantle) is one of the chief sources of annoyance in connection with the use of the burner. We kept a record in our office for some time past to ascertain the exact cost of maintaining the lights; then, I fixed the charge at about double that figure, to cover any carelessness that might be exercised by the consumers, because if they did not have to pay for them they would probably not be so much interested in preventing the breakage. By following the plan adopted in Columbus, we secure a great many places where they would not use the Welsbach, unless they could take advantage of this plan; as, for instance, printing offices, places with low ceilings, carpet stores, and in stores where they have machinery above them, gas engines, printing presses, etc. The result is that on a great many of these places we lose. I have here a report sent me since I left Columbus on the 8th of the month, of our business for the previous month. We have the months previous to that very carefully tabulated, and I arranged to have them sent to me here; they have not come, but I hope they may come in the first mail this afternoon. These figures are on a basis of about 890 lights. Some of the lights which we maintain we do not count in this number, because we do not charge for them. As, for instance, in our display rooms and around our offices and warehouse. On these 890 lights maintained in the month of February, there were 198 mantles used and 308 glass chimneys, and 5 No. 74 shades. The total amount we charged for that work was $124.80. The total amount that it cost us, without labor, was $91.14; the amount of gross gain was $47.52; and the gross loss was $15.08, making a gross profit, without labor—that is, taking the gross loss from the gross gain—of $32.44 to pay for our labor; so that it would probably leave a few dollars profit, counting the labor.

A Member—How much is your labor?

Mr. Doherty—Two boys are engaged on the work, one of whom gets $1.25 a day and the other gets 50 cents a day, and they have the use of a horse and wagon, which would make $1.75, plus whatever the wagon and horse might cost, and they generally work about half a day each day.

A Member—That would be about $1.50 a day.

Mr. Doherty—No, I do not believe it would be that much, would it? It is really about 88 cents a day.

A Member—Counting 50 cents for the horse and wagon half the time?

1. For Mr. Doherty's paper, the title of which is, "Selling Gas," see *ante*, p. 533.

Mr. Doherty—Figuring it that way it leaves us the loser; but, then, we would have to give these lights some attention, anyhow.

The Secretary—That, I think, is more than offset by the increased sale of gas and the satisfaction to both consumer and Company.

Mr. Butterworth—I would say, once for all, that the system we have adopted is working admirably. We are very well pleased with it indeed, and recommend it heartily to all.

Mr. Templeton—Figuring in that way you would still have a loss.

Mr. Doherty—Probably, figuring on that basis.

Mr. Templeton—They first pay for them and then you keep them in repair?

Mr. Doherty—I think that is the proper way, and I always try to have them make as heavy an investment as possible; try to have them buy a $100 chandelier, and fit it with Welsbach burners. I like to see them do this, because the more money they have invested in the fixtures the less liable they will be to abandon their use. With reference to the cost of maintaining them, that covers a wide range. Our report of the highest breakage, exclusive of labor, was over 33 cents per light, and the lowest breakage was less than one-third of one cent per light per month. But in both places the lights had been in for some time.

Mr. Templeton—Suppose you find you are losing on some particular consumer; do you take them out?

Mr. Doherty—No; we do not.

Mr. Templeton—I had a case of this kind. Above the store was a carpet room, and we found it extremely difficult to maintain the lights without an extra amount of breakage.

Mr. Doherty—Did you try the use of anti-vibrators?

Mr. Templeton—No.

Mr. Doherty—You should try some of them on the chandelier.

Mr. Templeton—Do they work all right?

Mr. Doherty—Yes; they work first-rate. Give the spring the right tension. The spring has to be the right tension or else you have to get the right weight, and load your fixtures with the weight, so that the jar will be regulated in that way. It is not the amount of the jar, but it seems to be the rapidity of the vibrations that breaks the mantles. Wherever we find the burners subjected to irregular vibrations, there is where we always find the heaviest percentage of breakage.

Mr. Templeton—Take, for instance, a furniture store. In moving the furniture about the room they strike the mantles, and smash them in that way.

Mr. Doherty—How about raising the fixtures? It is a well-known fact that light decreases with the square of the distance from a point, but when a reflector is used the decrease is not near so rapid. Of course the fixtures should be so located as to get the most equal distribution of light throughout the room, if that is possible; but in a furniture store, or anything like that, I would simply raise the fixtures until I got them out of the way, and then, if necessary, I would use a reflector or something of that kind to secure the proper distribution of light.

Mr. McDonald—My own paper takes up the same subject, to a degree, and I hope I shall not be considered egotistical if I speak briefly in the discussion of this paper on the same topic. I want to take issue with Mr. Doherty in one important statement he has made, wherein he says you need not hope to do heating, with artificial gas, unless we can convince people that the odors arising from the combustion are pleasant and healthful to breathe. If that was true the less we said the better; but it is not true. The loss of heat that is unavoidable from the combustion is less than 6 per cent. In other words, you can utilize all your products of combustion, and lose only about 6 per cent. The heater that is made within the limits of ordinary sheet iron workmanship will not lose more than 8, or at most 10 per cent. Now, then, isn't it much easier to induce gas manufacturers to make a heater which will meet these conditions than it is to persuade men that while they are down town during the day they ought to leave their wives and babies breathing carbonic acid gas?

Mr. Doherty—Well, Mr. McDonald, in the first place, as I told you the other day at the dinner table, I do not believe the products of combustion could be thrown off and such a small amount of heat thrown off with them. If that is the case, I prefer to have them thrown off. But I think that the alleged danger from the carbonic acid gas, and the excess of nitrogen and vapor, is a great big bugbear. The percentage of carbonic acid gas in our lungs at any one time is high, and I cannot help but think that the dangers which are claimed to follow from the inhalation of carbonic acid gas and the excess of nitrogen are exaggerated.

Mr. McDonald—Who wants to have his wife looking like a laundry girl? She is always pale and emaciated and generally broken down. I have never felt so sorry for any class of people as I have for operators in a laundry, breathing constantly the overheated, moisture-laden atmosphere of the room, robbed of a large portion of its oxygen; they have less vitality and less health than any other class of operators I know. No man ought to say that the products of combustion are very hurtful or disagreeable, until he has lived for a good long time in a room heated in that way. Now, I have done that, and I do not hesitate to say that no matter how good combustion is nor how pure your gas is, if the atmosphere is charged with the products of combustion, you will have headache, and your mental vigor and physical well being will go down, if you breathe that fetid atmosphere. There is no use trying eloquence or anything else to persuade people that it will not; and after a man has gone to a great big expense putting in such fixtures, and then finds by his own experience that it is true, after you have told him it is not true, and you go to him and try to sell him gas, you cannot do it.

Mr. Doherty—I will have to take issue with you there on that. All the offices of the Columbus Gas Company are heated with stoves without flues.

Mr. McDonald—How about the transom and windows?

Mr. Doherty—Any room has a certain amount of ventilation.

Mr. Jenkins—Can I ask how recently was Mr. McDonald's experience in living in a room of that kind?

Mr, McDonald—About three years ago.

Mr. Jenkins—I asked the question in view of Mr. McDonald's present emaciated (?) appearance.

Mr. McDonald—My situation in this respect was the cause that led me to investigate the subject. I did not live in that atmosphere the whole day, but my children did, and that led me to investigate it. I investigated it very thoroughly and compiled that investigation into the shape of some chemical and mathematical calculations, which I read to this Association three years ago, and which have never been challenged; and I do not think they can be challenged. They show—and they are true—that only from 5 to 7 per cent. of your heat need escape with your products of combustion. With the heaters as usually made, 75 or 80 per cent. does escape.

Mr. Jenkins—You are speaking of a theoretical gas stove, and not the common gas stove, when you speak of only 5 to 8 per cent. of heat lost. Do you know of such a stove being made to-day?

Mr. McDonald—Yes, sir; I do. I have just such a stove in my office, and by actual test it gives out 94 per cent. of the theoretical heat of the gas.

Mr. Jenkins—Is it so that a person can buy those stoves? Are they upon the market at all? Isn't this the stove you were telling us about last year, and when I asked you about it you said you hadn't it made yet? Is that the stove you refer to? You will remember I asked you last year with reference to that stove and if it was made, and you said not.

Mr. McDonald—The way you put your question seemed to lead me to the conclusion that my scientific calculations on the subject have been governed by my money interest, and that is the reason I answered you as I did.

Mr. Jenkins—The reason I make the inquiry is, that if such a stove can be obtained, I want that stove, and there are a good many other people here who want them.

Mr. McDonald—Send your order down to a gas stove firm in Louisville, and they will ship you one.

Mr. Jenkins—In other words, if such a stove is manufactured and on the market, and can be bought, we are the men who want to buy it.

Mr. McDonald—A manufacturer told me last month that "his firm sold 14,000 grates last year," but he also said he "would not have one of the d—'d things in his office;" and added, "as the people will have them we are going to make them, but you cannot make them so they wont stink, and I would not have one in the office." That is not true, there is not a word of it true. He said furthermore: "Even if we made a stove that was perfect, as you say it could be made, the trade do not know the difference, and they would not pay 50 cents a piece more for them." Unless the gas men, with their superior intelligence, will come to the assistance of the public, in explaining these matters to them, the trade will never be able to sell to the public a fixture which should be theoretically perfect, in competition with one which will sell from five to ten per cent. cheaper, and as far as can be seen gives no smoke. He doesn't see anything coming from it, hence, he doesn't believe anything does come from it.

Mr. Jenkins—I think we can soon convince you we will sell that stove if we can get it.

Mr. Watt—I would like to ask Mr. Doherty if gas for heating is not somewhat of a luxury, even at 20 or 30 cents a thousand; and doesn't it cost a great deal more than coal, when used in ordinary appliances? Would it not be possible for the gas to be used with a hot water heating apparatus instead of coal for convenience and economy.

Mr. Doherty—Mr. Watt, I would say that as gas can be taken right into the space to be heated, you could not gain anything in heating hot water. Your hot water won't give out any more heat than you put into it. I think, without having spent much time on the subject, that the only way you can do is to use the hot water for a radiating surface, and in that way make a larger warm surface, instead of a smaller hot surface, and probably you could get a more pleasant delivery of heat than you would in the other instance with gas alone; but you could not gain any heat by it. You could not make the gas impart any more heat, although you might make it a little more efficient, because if you were to burn this gas flame in the room, without any radiating material around it, the products of combustion and the heated air would go directly to the ceiling and be so much more highly heated that the ceiling would absorb a greater quantity of the heat than if you should bring your flame down very low and introduce a radiating surface. Then the heat would be thrown off in that part of the room where it was needed, and there would be no more products of combustion.

Mr. Watt—Why couldn't a gas stove be utilized in this way, by using hot water through the house for heating purposes in the radiators, and to use gas for fuel in the furnace or under the boiler in the cellar instead of coal?

Mr. Doherty—It would not be as cheap as to take the gas to the rooms and use it there, because there would be necessarily some loss in distributing it.

Mr. McDonald—I have seen the arrangement used, but it is very expensive. I would say, however, that the expense depends largely on the condition of your fire. If you give your fire a larger volume of air than is necessary most of your heat goes up the chimney. All of the heat you give to the water comes up into the house; of course, that which goes off with the moist air you do not get. But it cannot be as cheap, or certainly cannot be any cheaper, than the heating apparatus placed directly in the room. Our experience in this regard is, that they are neither much more expensive nor much cheaper than the other, depending upon how the fire is built and how perfect the combustion of gas is.

Mr. Watt—I would like to ask whether gas, used in this way, when it is 25 per cent. higher than hard coal, is not really cheaper and preferable for heating purposes, in connection with hot water apparatus, than coal, considering the dirt, ashes and other inconveniences connected with the use of coal.

Mr. McDonald—With artificial gas at 80 cents a thousand, I should say not; but 25 per cent. additional is nothing like the limit that the public will pay for the difference between gas as a fuel and coal as a fuel. They will, after being educated up to it, pay twice for gas what they will pay for coal. Another thing, though. The most convenient form of heater, as well as the one that utilizes the gas to the best advantage, is not the heater in the cellar. Somebody else tends to the heater in the cellar. There is only one fire to keep up and it is not much trouble, but where the fires are in each individual room, the convenience of being able to light them instantly, to turn them down when the room gets too hot, or to turn them out when you don't want them any longer, is something that people will pay three or four times the price of coal for, when educated up to it. For a furnace, or steam, or hot water heater, I would say that gas has to be within 30 per cent. as cheap as coal, but for a heater in the room where it is used, gas will be sold for that purpose, even it costs three times the price of coal to maintain it when the consumer properly appreciates its convenience.

Mr. Templeton—Having studied the question and made a good many experiments as to the use of gas for heating purposes, I have arrived at the conclusion that, wherever you want a steady and strong heat, gas at $1, or 85 cents, or 60 cents, is away out of sight, as compared with coal. The conclusion I have come to is, that the most we can hope for in the present condition of the gas business, is to advocate a coal heater of some kind, steam or hot water, or even hot air, to be used in connection with the use of gas. We have in several instances taken a hot air heater and supplied it with a combination fixture—a pipe running through the heater up to the boiler in the kitchen, to supply hot water, with a return to the radiator, so that we heat with the same fire in the cellar, and get hot water from the same fire in the cellar during the winter time. Then we advocate the placing of gas stoves throughout the house. In the summer time they can afford to use gas for heating water, and they can afford to use it for heating in the Spring and Fall, and also for cooking, but we do not recommend it for steady heating in any place. I have tried the heating of rooms with different kinds of stoves. I had one of these stoves that have water in them—the name of the stove I have forgotten. I tried it for a while, and then put a reflector stove in the same room and put a chimney on, and my gas bills are not more than one-half as much with the reflector stove with the chimney as they were with the other stove without the chimney. I do not believe that one stove will make much more heat than another, if you burn it in the open room; but I do believe that what you want is a stove that will put the heat where you want it. You don t want your head warm, but you do want your feet warm. Sitting beside a reflector stove, with the thermometer at 50, I will be more comfortable in a room heated by a gas stove such as I suggest, than I would be in the same room heated by a coal stove, with the thermometer at 75, with one's feet cold and one's head hot.

On motion of Mr. McIlhenny a vote of thanks was tendered to Mr. Doherty for his very excellent and able paper.

A Special Train for the Western's Meeting.

Mr. Jenkins—Before we adjourn I simply want to say that we are trying to get back at you now. Yesterday you were joking Brother Thompson and the Secretary of the Western Association, but to-day I am going to see if we cannot get even with you. I want you all to remember that next May we are going to have a meeting of the Western Gas Association, in Chattanooga—the third Wednesday in May. We want, if possible, to get one or two car loads of passengers to go from Cincinnati on the Tuesday morning before the meeting, and make the daylight run over the Cincinnati Southern, landing at Chattanooga at about 7:30 in the evening, leaving Cincinnati about 8 or 9 o'clock in the morning. We are agitating the matter now and want to get as many as we can to make the trip with us. As many of you as can conveniently do it, if you will let me know within a short time, we will try and make the necessary arrangements for, so that we will all have one of the nicest trips we have ever made. Already we have pledged to us enough to almost fill the first car, and we would like to have two or three cars if we can run them. I think we can get an observation car as part of the outfit, and I will assure you, if you have not been over the route, you will find it a very beautiful ride; if you have been over it, you then know what it is.

An Acknowledgment from Mr. Slater.

The Secretary—I received a letter from the Secretary of the American Association this morning, which reads as follows:

"Providence, R. I., March 17th, 1896.

"A. P. Lathrop, Sec'y., Grand Hotel, Cincinnati, Ohio:

"Dear Sir—Your very kind invitation to be present at the Twelfth Annual Meeting of the Ohio Gas Light Association was duly received, and I thank you very sincerely for it, though I am sorry to say that at present my duties are such that I am unable to get away from my work here, and consequently am unable to attend your meeting. I sincerely wish you a thoroughly successful and happy meeting, and hope to see many of your members at St. Louis in October. Yours truly,

"A. B. Slater, Jr., Sec'y."

Mr. Thompson—In connection with Mr. Jenkins' offer, I may add that we are attempting to do something in a similar line with regard to the Chattanooga meeting from St. Louis. I doubt if we can get more than a single car. It is not quite so pleasant a ride from St. Louis as from Cincinnati, and takes up about 18 hours' time. But if any gentlemen present are going, or know of others who will be going, from St. Louis to Chattanooga at that time, if they will communicate with me, we will take great pleasure in providing for them in our special car.

The President—Gentlemen, I am very much obliged for the kind invitation, and tender you the thanks of this Association for the courtesy. I am satisfied that everybody will be nicely treated by the Western Association—I am a member of the Association myself, and I know that they always treat visitors very kindly. We would be glad to see as many visitors as possible avail themselves of the invitation so kindly extended this morning.

Mr. Jenkins—One more suggestion before we adjourn. I hope the Association will be able to get through as early as possible after dinner, and avail themselves of the invitation we have extended to them to visit Covington, Ky., and Fort Thomas, as the guests of the Covington Gas Company. We will assure you a pleasant trip over the river, and cars have been ordered for that purpose at 3 o'clock. If you are not ready at that time, we will await your pleasure. If you cannot go, of course

we will feel disappointed, but will make the best of it. We will try to make it a pleasant trip, but I want to say to you in this connection that we will not attempt to duplicate the Cincinnati entertainment yesterday afternoon in any way, shape or form. I want to add that for several weeks General Hickenlooper, Mr. Salter and myself, have labored earnestly and at a great deal of expense getting up this weather for you. (Laughter.)

On motion the Association "recessed" until 2 P.M.

SECOND DAY—AFTERNOON SESSION.

The President called the Association to order on the termination of recess, and announced that the

QUESTION BOX

would again furnish the next topics for discussion. He then read Question No. 8, as follows:

"Is acetylene gas a commercial success; can it be used as an enricher for gas of a less candle power?

A Member—It is generally conceded that it is not a commercial success.

The President—I don't think you can buy calcium carbide for less than $100 a ton.

Mr. Templeton—I know of a case recently where it cost $100 a ton, and it was found too expensive for gas.

The Secretary—What are they using it for?

Mr. Templeton—The Carnegie people used it for some commercial purposes.

The President—That is the least price I knew it to be sold for.

Mr. Templeton—The entire output of the United States, which consists of one mill, has a capacity only of 1½ tons per day.

The President—Question No. 9 reads:

"What is the comparative economy of gas as against coal for operating an engine?"

Mr. Templeton—I think that depends entirely upon the size of the engine. We are running several small gas engines, 4, 5 or 6-horse power. It costs us for gas as much as coal, but we save the wear and tear and labor.

The President—It is more economical for small horse power.

Mr. Templeton—Anything up to 25-horse power.

Mr. McDonald—I would hate to see this question passed over without more discussion, because I am satisfied it presents one of the very best fields for the employment of gas. The development of it in Germany shows that; and all gas men, in fact all who have used it, admit that with 20 feet per hour you can get a horse power with a gas engine. If you figure that down, with reasonably cheap gas it is not only cheaper but very much cheaper than coal. It must be remembered, also, that the gas engine has been perfected and improved lately to such an extent as to remedy the complaints and difficulties formerly made against it. Among other things the greatest nuisance about a gas engine was that it always caused a smell and noise. Now they have it so improved and perfected that it is perfectly silent and no odor about it. It seems to me the gas engine is a friend to the gas man, and he ought to encourage and foster its use. We are not doing our duty in this country, if judged by the results that are being obtained in other countries, with it. There, instead of being confined to small horse power, they apply them to hundreds of horse power and operate them very successfully.

The President—Mr. Guldlin, we would be pleased to hear from you. We know you are a gas engine man, but you do not need to talk about your own engine particularly.

Mr. Guldlin—As Mr. McDonald said, the comparative economy of gas as against coal, for operating an engine, depends upon the size of the engine and the time it runs, and also the price at which you are producing gas. For small horse powers I don't think there is any question about the economy of gas—the results are largely in favor of the gas engine; but for larger powers it has been proven conclusively that 1-horse power can be produced from 1 pound to 1½ pounds of coke. Of course that is far in advance of the best results obtained from the Corliss, or similarly constructed steam engines. At the same time, I do not know of any producer plants that utilize soft coal. They have had to use coke or anthracite coal. The largest gas engine successfully used in this country, used natural gas. I do not know of any above 100-horse power, successfully operated with illuminating gas. To answer the question intelligently, it will be absolutely necessary to know the conditions under which the comparison is to be made. It can only be summed up in a general way otherwise.

The President—I wish to call your attention, Mr. Guldlin, to the 10th question in this same connection:

"What new developments have there been in gas engines?"

Mr. Guldlin—Well, there have not been any new developments in gas engines to my knowledge since the development of the Otto cycle, except in this way. The last few years there have been constructed gas engines of what is known as the double acting pattern, that is, they have double the number of impulses compared with the single acting engines. Another improvement that I know of is to increase the speed of the engine itself, and maintain the Otto cycle, in order to obtain a more steady operation. Otherwise I do not think there is really any improvement. Several parties have for some time been endeavoring to develop an engine which will produce a steady incandescent light, on which line we have also been working, and we think the trouble can be solved satisfactorily. But otherwise, I do not know that there has been any improvement. As far as improvements which will radically reduce the cost, I think there have been none.

Mr. Jenkins—In answer to question 9, as to the comparative cost, I made up a statement for our Company of the engines we have in use in Covington. I have the name, location and horse power, and what the engine was used for, and then, following below that, each month for 12 months is a statement showing the consumption each month, and the total cost per year and cost per month. I will just give you the totals. For instance: Ten-horse power used for grinding paint; total value of gas used in a year, $41.25, or $3.44 per month.

A Member—What does that represent in feet?

Mr. Jenkins—I will also give the feet: 33,000 feet, at $41.25 per year, figured on a basis of $1.25 per 1,000, making $3.44 per month. Six-horse power, to run ice cream freezer, and such as that (they run winter and summer as well), 32,800 feet, $41; $3.42 per month. Four-horse power, running freight elevator, 10,100 feet, $12.63; $1.05 per month. Ten-horse power, grinding paint, 35,400 feet, $44.25 per year; $3.69 per month. Four-horse power, used in printing office, consumed 38,300 feet in a year, $47.88; $3.99 per month. Another engine (I could not tell the horse power because they changed it once or twice) used 21,400 feet of gas in a year, at a total cost of $26.25, or $2.23 per month. I do not believe you can get anything more economical than that. They were not run continuously. For instance, they would run the 10-horse power sometimes one hour per day, and sometimes more, and some days they would not run it at all. To run a steam plant in similar manner, you could not begin to touch it at any such figure, I do not care how economically it was operated. I want to call attention to the fact that four years ago, at Louisville, I read a paper which you will find printed in the JOURNAL, giving a comparative statement of this kind; and Mr. Shelton, two years ago, read a very exhaustive paper on the subject of gas engines, either of which papers will give you information upon the subject.

Mr. Holmes—I would like to ask Mr. Jenkins if these are exceptional cases.

Mr. Jenkins—Those are all the gas engines in our town. If there were more I would be glad to include them.

Mr. Templeton—I had a similar experience. We had a 4-horse power gas engine, in a printing office, that was used to run two small printing presses, besides the big press, and the average gas consumption of which during two years was 1,300 feet per month.

Mr. McDonald—I can give a figure that will probably be more useful than that. A 15-horse power engine worked up to and above its capacity, ran a planing mill 10 hours a day, and every day, for $60 per month; and even then the cost is but one-fourth the cost of coal, after you have added fireman and everything else.

Mr. Guldlin—Another question that will come up in connection with this subject: There are several instances of buildings in which it is impossible, or at least difficult, to get gas established, and where the question of an isolated electric plant comes up. I have seen experiments with gas engines in which, for 27 cubic feet of gas per hour, we have one killowatt; that means 20 incandescent lights. At $1 per 1,000 for gas, that would be equivalent to .13 of a cent per hour, for one hour, for a 16-candle power incandescent lamp. I think in that field there is an opportunity for gas men encouraging the establishment of isolated plants and selling gas. Those are actual figures from tests I have taken part in myself.

The President—The next thing in order will be the paper on the subject of

VENTILATION OF GAS HEATED ROOMS,

by Mr. Donald McDonald, of Louisville, Ky.

Mr. McDonald read as follows:

To the President and Members of the Ohio Gas Light Association :

Gentlemen—The ventilation of living rooms is one of the most important subjects with which the human race has had to deal. It is vain to supply a man with good food and pure water if his lungs are obliged to deal with bad air.

Like all other very important problems, this one was solved in a scientific way long before science itself was dreamed of. We can imagine a long and painful series of experiments guided by no other rule but that of the survival of the fittest, before the open fireplace with its radiant heat and its continual draught of foul air from the floor became the standard method of heating.

Cost aside, I do not consider it possible to devise any better system of ventilation than is provided by an open fireplace, and the nearer our methods approach to this, the nearer, in my opinion, they come to perfection.

With the introduction of furnace heat the problem is considerably modified. Large volumes of air, either hot or warm, are admitted into a room, and left to chance to distribute themselves. If the fireplace has been left open, the displaced cold air will go up the chimney, and the room be filled from the top with warm, fresh air. This gives an excellent result. If the flue is closed, the expelled air must then trust to bad carpenter's work for its exit, and the result is, of course, problematical.

Steam heat—using direct radiation—again presents an entirely different problem. The air of the room is heated by a radiator, the chimney usually closed, and, but for accidental openings, the same air might remain in a room for weeks, and be breathed over and over again, and gather to itself all sorts of organic impurities.

Steam heat—indirect radiation—is simply a very good hot air furnace.

When gas heat is introduced, the problem is again modified. Not only must we deal with the vitiation of the air by the inhabitants of the apartment, but we must also take into consideration the fact that the gas heater itself, in most cases, is putting out into the apartment large volumes of carbonic acid, water and nitrogen—sometimes less harmless gases—and that it is continually taking from the air of the room the life-giving oxygen, leaving the air to this extent dead and uninvigorating. The products of combustion of any fire are neither more nor less than what the miners call "after-damp." That is the gas which fills the mine after an explosion has taken place. For want of any other short expression, I shall speak of them in this paper by that name.

All gas heaters may be divided into two classes. One class sends this "after-damp" up the chimney, and the other puts all, or a part of it, out into the rooms. The last class is decidedly the most numerous, and I will first take up the different ways of accomplishing this result.

First of all, there are stoves, radiators and fires without any pretense of a flue. These are admissible in rooms which are used only occasionally, or which are opened very frequently; or, by providing abundant ventilation, a fairly good atmosphere may be maintained in any room with this class of heater. For bed rooms, for sitting rooms or any other close room where the fire is burnt constantly, and the windows kept closed, this class of heater cannot be condemned too strongly.

Next comes the heater with a pretense of a flue; I say pretense, because most of the flues provided are totally incapable of carrying off more than a small fraction of the "after-damp" and the air that mixes with it as soon as it is formed.

I have seen a gas grate 24 inches wide provided with four ¼-inch round tubes to carry off all the products of combustion. The manufacturer had soothed his own conscience, and the purchaser, no doubt, congratulated himself on the good ventilation he would get, but, as a matter of fact, these tubes are able to carry off less than 4 per cent. of the "after-damp" from this fire, and might just as well have been left out altogether.

Another genus of this species of heater provides an ample flue with a damper to close it. The customer finds by experience that he gets very little heat when the damper is open, and consequently closes it tight and allows it to rust in that position.

An open gas fire with a real flue (that is, a flue capable of carrying off all of the "after damp,") is a class to itself, and can only be used in towns where natural gas is sold at a low price. It heats entirely by radiant heat, carries a large amount of air up the chimney, and is an excellent ventilator in every respect. It has only one drawback, and that is that as it only utilizes about 15 per cent. of the heat, its use is absolutely restricted to the fields where cheap natural gas can be obtained.

It is hardly necessary to discuss the effect of gas when it is burned in an ordinary furnace in place of coal. None of its products of combustion enter the living rooms, and it has in every way the same effect as a coal fire, the ventilation depending on the arrangements for carrying off the spent air, and the economy depending on the perfection of the combustion, and the degree to which the products of combustion are cooled before they reach the flue.

The furnace without a flue would seem at first to belong with the first class of stoves described. As a matter of fact, it is a much better fixture. A gas flame is placed directly in the air jacket of a furnace, and while it sends into the house all of its products of combustion, it sends also a large volume of fresh air. Assuming that the volume of fresh air is 50 times as great as the volume of the after-damp, and remembering that for every foot of this warm mixture which enters the room, a foot of air must be driven out somewhere, we are certain that the percentage of after-damp can never exceed that which rises from the furnace pipes, while in a close room, heated by a flueless heater, the air is continually passing through the fire, and the mixture is being concentrated.

The principal drawback to this plan is that if the gas should become extinguished for any reason, and continue to flow, the house will become filled with a very dilute mixture of air and gas. All sorts of flueless stoves are open to the same objection, although, of course, where the fire is in a living room, the fact that it had become extinguished would be detected much sooner. It is highly improbable that the mixture of air and gas would ever become sufficiently rich in gas as to be explosive, even if the furnace became extinguished, and it remained undiscovered for a week.

The "Backus Heater" might be supposed, at first, to require a class to itself, but it really belongs with the flueless gas stoves. It is true that it has a flue, but the instructions are to close it as soon as the fire gets to burning well, and after that it avowedly puts out into the room all of its products of combustion. Like all other flueless stoves, where the combustion is good, it utilizes every particle of the heat of the gas, and puts out into the room every particle of the after-damp. The water from the so-called vapor pan only adds its quota of steam to an atmosphere already unbearably moist. The water which it vaporizes in the boiler, and then condenses again in the radiator, simply gives to the room heat that it has already taken from the fire, no more and no less, and plays no part whatever in the ultimate result on the temperature of the room.

When we come to heaters with real flues, there are very few on the market, but such as there are are rapidly finding favor with the public. Leaving out those which are designed exclusively for the use of very cheap natural gas, the essential requirements of this class of heater are that it shall not carry off all of its products of combustion, but that it shall provide sufficient radiating surface to abstract from them and give to the air of the room all of their available heat before they reach the chimney. It is also essential that this shall be done without allowing any part of the heater to approach red heat, as air which has come in contact with red hot metal is always disagreeable and frequently poisonous; and besides, iron that is kept red-hot will not last long. If this requirement is fulfilled, we have then in our gas heater exactly the same conditions as to ventilation which we would have with a steam radiator (no better and no worse), and in order that the room shall be pleasantly and properly ventilated, an opening must be left in the bottom of the plate which covers the fireplace, so that the chimney shall continue to draw away from the room a large quantity of air from the floor. By taking cool air from the floor, and not allowing it to pass through the fire, we get the same ventilation that we would have with an open fireplace, while at the same time we utilize a much higher percentage of the heat. I consider it possible to utilize 94 per cent. of the theoretical heating value of the gas, without allowing one particle of its products of combustion to escape into the room; in fact, this result is accomplished whenever the combustion is perfect, and the products of combustion are delivered to the chimney at a temperature as low as 225°, and when (a most important consideration) no other air except that necessary for combustion is allowed to pass through the stove and up the chimney, thus uselessly carrying away its share of the precious heat.

In order to ascertain just how much heat it was possible to save *without* cooling the products of combustion, I took an ordinary fireback, with flames coming out over its whole surface, and heating asbestos wool. I made a thin box of wood, with a face of black sheet iron, and fastened it within 3 inches of the face of this burner, so that each square inch of hot asbestos had immediately in front of it a square inch of dark sheet iron. The box was filled with cold water, and natural gas was burnt in the burner at the rate of 1 foot per minute for 18 minutes. The result was that the water was heated from 42¼° F. to 100° F.,

while the products of combustion, together with the extra air which they drew in with them, escaped at a temperature of 390°. The velocity of the escaping air was measured with an anemometer, and, after correcting for temperature, I found that 2,107 cubic feet of air, at 60°, had passed through and across this fire, and had been heated from 44° up to 390°, carrying off with it 13,312 heat units. The water on the other hand weighed 27 pounds, and being heated through 58½°, had absorbed only 1,579 heat units, so that the total number of heat units accounted for in the water and air together was 14,891. The total heat in the gas consumed was 16,038, so that 1,147 heat units remained unaccounted for. Some of this heat went through the back of the heater; a portion was radiated sideways and disappeared. Allowing for these losses and for the want of any scientific accuracy in the construction of the apparatus, I think it is safe to say that at least 85 per cent. of the heat of this fire went off in the shape of hot air, and not more than 15 per cent. appeared in the shape of radiant heat.

I do not believe it possible with any form of burner to bring the percentage of radiated heat up higher than 20 per cent., so I think it is evident that if the high priced heat of artificial gas is ever to be used as a general heating agent, we must either make up our minds to cool these products of combustion before they escape, thereby utilizing their heat, or to tolerate the atmosphere which they produce when they escape into the room. The latter, the public may do for awhile, but I am satisfied that, if the practice becomes general, gas heating will become associated with headache and bad odor, and when this occurs, its introduction will be difficult indeed.

I was talking not long ago with a very large manufacturer of gas heaters, and called his attention to some of these facts. His reply was, "That a coal gas heater always smelled bad, that the bad odor could not be avoided, and that even if it could, the public would not pay the extra cost of a fixture made for this purpose. The demand of the trade was, first of all, for a handsome fixture, next, for a cheap one, and, third, for one which would give a great deal of heat with a very little gas." He said also, "That he knew a man who was working on a patent burner, which he believed would give such perfect combustion that there would be no products of combustion of any kind." In other words, he believed that 4 pounds of gas and 80 pounds of air could be burned together, and leave absolutely nothing. Be utterly annihilated.

Considered from a scientific standpoint, the manufacture of devices for gas heating is far behind that of appliances for gas lighting or gas generating. Competition is certainly keen enough, but with a few worthy exceptions, it seems to expend its energy in nickel plate, which heat destroys, and in extravagant claims of immense economy to be gained by the perfect combustion caused by some patent burner.

I will here state a few facts about combustion, which seem almost axiomatic, and as an apology, I will say that I have heard every one of these propositions vehemently, and almost fiercely, denied by men who seriously claim that, when they mix 8 feet of air with 1 foot of gas, they get 8 times the heat out of the flame. If the makers and sellers of gas fixtures could really be convinced of these propositions, I believe they would then expend their energies on improvements, which would actually improve.

Axiom 1. The complete combustion of a cubic foot of gas produces practically the same amount of heat, no matter how it is burnt.

2. High flame temperature, or superheating either the air or the gas, has no effect whatever on the quantity of heat produced.

3. The only products of the complete combustion of hydrocarbon gas are carbonic acid and water, and no amount of ingenuity can have the least effect on the quantities of these produced.

4. Combustion of coal gas is practically perfect when it produces neither odor nor soot.

5. An ordinary fishtail burner will give just as much heat per foot of gas burned as the most expensive and most delicately adjusted gas heater. It will also give exactly the same products of combustion, both in kind and quantity.

The combustion is certain to be almost perfect in a fishtail burner, or any other open flame of unmixed gas, and is apt to be imperfect when too much air is mixed with the gas, or where the flame is finely subdivided, or where the combustion is confined in a small box or tube which excludes the air.

The fishtail burner fails to heat the lower part of a room, simply because the heated air will not descend. If placed at the floor it would give out exactly the same amount of heat as a flueless gas stove burning at the same rate.

Let us now consider the condition of a room heated by each of the above methods. Let us take the same room and the same temperatures in each case.

Suppose a room 16 x 16 ft. x 11 ft. 9 in. high, with two outside brick walls, and two windows, 3 ft. x 8 ft.; let it be in a house where the adjoining rooms on the same floor, and also the rooms above and below, are heated to 70°. Let the outside temperature be 30°, the humidity 70 per cent. of saturation, and no wind. Let us suppose two adult inmates. It is required to maintain the temperature inside the room at 70°. Let us leave an opening in the bottom of the fireplace plate large enough to send up the flue 3,000 cubic feet of air every hour, thus changing the air once each hour. Such a room would contain 3,000 cubic feet of air, it would have 48 square feet of window surface, and 44 square yards of outside wall surface; no heat will be gained or lost from the floor, ceiling or inside walls, and we can only approximate the loss by excessive radiation and leakage of hot air from the top part of the room. This loss is simply a waste of the warmest air in the room, and should be prevented as far as possible.

This room will require, for each hour, heat as follows:

To warm 3,000 cubic feet of air from 30° to 70°	2,227 heat units.
To supply the loss by radiation through walls and windows	2,126 "
To supply the loss on account of the overheated condition of the top part of the room	1,767 "
Total heat required per hour	6,120 heat units.

Let us suppose that this heat is to be furnished by burning coal gas of 680 heat units per foot; suppose the gas to be of a composition which will produce 57 cubic feet of CO_2 and 6¼ pounds of water for each 100 cubic feet burned.

(If natural gas is used, the quantity of gas required will be about 30 per cent. less, but the products of combustion will be about the same.)

If this heat is supplied by any kind of "flueless" gas stove with ordinarily good combustion, then it would require 9 feet of coal gas per hour, or 6.4 cubic feet of natural gas. The air would receive from the fire 5.13 cubic feet of CO_2 and .56 pounds of watery vapor. The air would also receive during each hour 1.2 cubic feet of CO_2 and 3 ounces of water from the exhalations of the inmates. The condition of the air would therefore be:

CO_2	24 parts in 10,000.
Humidity	47 per cent. of saturation.
Oxygen	98 per cent. of normal.

This is not bad.

The above calculations only provide for *maintaining* the temperature of a room already warmed, and surrounded by warm rooms. If the room is cold, and we wish to heat it, we must burn enough additional gas to warm the walls and the furniture. Thirty-one feet of gas would not be too much to allow for this purpose.

An exposed room or a lower temperature outside would also call for more gas.

Below is the condition of the air of our room after burning 40 feet of coal gas, or 29 feet of natural gas, in one hour:

CO_2	83 parts in 10,000.
Humidity, 100 per cent. Air saturated, and some water condensed on the windows.	
Oxygen	91 per cent. of normal.

This is certainly bad enough.

We must remember, however, that the ventilating flue is frequently either omitted or closed by these economists, and the air is carried through the fire again and again, until the oxygen is so depleted and the CO_2 so increased that perfect combustion is no longer possible.

I have analyzed the air in such an apartment. The windows were covered with ice. The air saturated with moisture. The CO_2 was 220 parts in 10,000, and the oxygen 80 per cent. of normal. Such an atmosphere is not fit for a dog kennel.

An open gas fire with a really efficient flue would burn about 75 feet of coal gas per hour, and would give an atmosphere as follows:

CO_2	4.2 parts in 10,000.
Humidity	25 per cent. of saturation.
Oxygen	100 per cent. of normal.

This atmosphere is excellent. The cost is ruinous.

The heater with a pretense of a flue will give either a low cost and bad atmosphere, or a high cost and good atmosphere, according to the size and efficiency of the flue. If it is worth while to carry off any of this "after damp," it is certainly worth while to carry it all off.

In considering the above results it is worth while remembering that the out-door air on a very pleasant day would be about as follows:

CO_2	3 parts in 10,000.
Humidity	30 per cent. of saturation.
Oxygen	100 per cent. of normal.

With reference to the effect of humidity on the atmosphere of a room it is a fact that nearly all persons, using stoves of any kind, think it is necessary to provide some means of evaporating water so as to avoid what they call the "dry heat." I have heard people complain of this "dry heat" at a time when their windows were dripping with moisture, and the air of the room had in it every particle of watery vapor that it was capable of carrying. In other words, "dry heat" is simply a misleading name that has been adopted for a disagreeable heat.

The air out of doors is pleasant just in proportion as it is dry.

A day when the thermometer is 95 and the humidity down to 30 per cent. is a pleasant day, while with the thermometer 90, and humidity up to 95 per cent., the day is oppressive, sticky and disagreeable.

Of course, any practice which becomes customary has behind it somewhere a reason, and I think that this practice of putting vapor into heated rooms came from the fact that the rooms were frequently heated with stoves so small in proportion to the work they had to do, that they became red hot, in this way charring the particles of dust which are always floating in the air, and perhaps also putting out some carbonic oxide. The watery vapor would certainly carry down a large portion of these charred motes, and might have some effect on the other gases.

Where the stove is not too small, and is not allowed to become very hot, where in other words we *warm* a large volume of air instead of *scorching* a very small volume, I am satisfied that these vapor pans are not only useless but that they are much worse than useless; and while it may be possible to have the air of a room too dry, it is very easy to have it too wet, and the wet condition occurs much more frequently than the dry. I know of no exception to the rule, that a dry climate is healthy and agreeable, while the moist, fog-covered lowlands are almost invariably oppressive and unhealthy.

This paper may fall into the hands of someone entirely unacquainted with chemistry, and, for his benefit, I will say that CO_2 stands for carbonic acid gas. It is the product of the complete combustion of carbon. It is given off by the lungs of all animals, and is absorbed by the leaves of all plants. It was known to the ancient alchemists as the "Spirit Sylvester" and was considered a very malignant ghost (geist, gast, gas). It is the gas which smothers the workman in deep wells and caves, and while it is not actually poisonous, it has always been considered a very objectionable ingredient in air which is to be breathed.

Most authorities on ventilation agree in saying that the proportion of this gas should never exceed 12 parts in 10,000, and although men can stand an atmosphere containing a much higher proportion than this, especially where it proceeds from some other source than the lungs, there is no question that it renders the atmosphere heavy and disagreeable, and to some persons exceedingly oppressive.

CO, or carbonic oxide, is the product of the *incomplete* combustion of carbon. It is one of the chief ingredients in water gas, and is poisonous to the lungs, even if breathed in small quantities. It can be produced by passing air containing carbonic acid over red hot iron, the iron taking up one atom of the oxygen and forming rust, while the carbon and the other half of the oxygen go off in the shape of carbonic oxide.

Water (H_2O) is *necessarily* formed whenever any gas containing hydrogen is burned. All illuminating and heating gases contain hydrogen.

Let us now consider the case of the same room, heated with a gas heater, with a real flue—that is, a flue that sends *all* of its products of combustion up the chimney, but does not send up anything else. It is not possible to utilize more than 95 per cent. of the theoretical heat of the gas in a heater of this kind, and as any excess of air entering the heater impairs its efficiency, I am going to assume that only 90 per cent. is utilized. In order to give an agreeable heat, any heater must have enough radiating surface to do its work without itself even approaching a red heat. It is much better to warm 1,000 feet of air to 100 than it is to heat 100 feet of air to 1,000°.

Assuming that this condition is met, we are justified in reducing the loss due to the overheated stratum of air at the top of the room by one-third, and perhaps more. This will bring the consumption as low, and I think lower, than that given for the flueless stove. The CO_2 will be only that due to the inmates, and will amount to 7 parts in 10,000. If no moisture is intentionally added—and my own experience is that none is necessary—the humidity will be 25 per cent. In other words, we will have as perfect ventilation as is possible with any system of heating. This plan can be easily and cheaply applied to houses that are already built. I have so applied it, and, in fact, I live in a house heated and ventilated in just this way. I find it satisfactory in every particular, including the important one of cost. The cost, however, is reckoned with natural gas at 35 cents per 1,000 feet. If I had to depend on artificial gas at 75 cents per 1,000, I would either get a more warmly built house, or else do the principal heating with coal, and use gas only for occasional fires.

Let me say, in conclusion, that it is the interest and the duty of every gas manager to inform himself and his customers about this most important matter, and to discourage in every way the use of gas for heat in all cases where the ventilation has not been provided for with such care and intelligence as to insure his customers an atmosphere suitable for human beings to breathe.

Gas heat is already more convenient than any other heat. It can also be made as cheap as a flueless stove and as agreeable as the open fireplace. We should be satisfied with nothing less than these results, and when they are reached no solicitors need be employed to extend the use of gas for fuel.

Discussion.

The President—The paper just read is of great importance and interest to us all, and I would like to hear it ably and freely discussed.

Mr. Templeton—I always knew that the combustion of gas was a chemical process, and have always believed what Mr. McDonald has said in his paper in that regard. I saw it, however, but once in print, and have never found any authority for it; and I have heard it controverted time and again. While it seems to me to require no proof, I would like to ask Mr. McDonald what he bases his statement upon.

Mr. McDonald—I have common sense, reason, chemistry and mathematics to base the statement upon, and those are my authority, to say nothing of such experiments as I have made. A Junkers calorimeter will give you a result equal to the theoretical heating value of the gas. The ordinary Bunsen flame, without attempting to superheat, will heat enough pounds of water to show every particle of theoretical heat there is in the gas, and sometimes results higher than the theoretical heat. That shows the full heating capacity of the gas is gotten without a high flame temperature. Now, when you use gas in the Welsbach light some of the energy disappears in the shape of light, and of course you cannot get the full energy in the heat while you are getting a portion of it in the light. That may be a valuable pointer for a Welsbach agent, but the proportion of energy disappearing as light I do not think is much; probably not as much as 4 per cent.

The President—Mr. Jenkins, we would be pleased to hear from you.

Mr. Jenkins—Those members who were at Springfield last year heard from Mr. McDonald and myself at considerable length on this subject, and I do not think they want to hear from us this year. I am not going to discuss the subject at all, but call attention to page 4 of Mr. McDonald's paper, where he says, "The Backus heater might be supposed, at first, to require a class to itself, but it really belongs with the flueless gas stoves. It is true that it has a flue, but the instructions are to close it as soon as the fire gets to burning well, and, after that, it avowedly puts out into the room all of its products of combustion." Now, Mr. McDonald, I do not think you have studied the Backus heater, if you say it has a flue.

Mr. McDonald—Mr. Backus told me that.

Mr. Jenkins—There is no flue to the Backus heater; none whatever, and never has been.

Mr. McDonald—In the heater in the private car at Springfield, which Backus explained to me himself, along with a great many other gas men at the time, he showed us a flue and told us as soon as it got to burning well to close it.

Mr. Jenkins—I have sold several hundred of them, and I never saw one yet that had a flue.

Mr. Doherty—I never saw one either.

Mr. McDonald—They might have found them useless and discontinued their use. Some of you know more about that than I do, however. I only have Mr. Backus' word for it.

Mr. Jenkins—I have never seen them, and I have gone over the Backus heater pretty thoroughly.

Mr. McDonald—The one I saw at Springfield had a flue, and Mr. Backus showed me how to work it.

Mr. Jenkins—Mr. Backus may have been trying to "fix" you; he knew you would not have anything to do with a stove without a flue.

Mr. Butterworth—I do not think the fact of moisture is so objectionable as Mr. McDonald would make us believe, so far as the effect upon himself is concerned. I think, in the cases he cited, the atmosphere was affected by other things that were injurious, and the moisture

itself need not necessarily have been the cause of the injurious effects to which he has referred. In the case of the laundry girls which he mentioned, they were working in an atmosphere that undoubtedly contained moisture, but it also contained heat and the impurities from soiled clothing and other agencies that may have caused the deleterious effects rather than the moisture. That I say is possible. I remember seeing the statement in the *Journal of Gas Lighting* that countries where the atmosphere was moist were as healthful as those where the atmosphere was dry. I am not sure but that the author of the article stated that they were more so, and I am safe in saying that the statement was made on some authority—I do not remember what now—that they were as healthful.

Mr. McDonald—I wrote to the Department of Health, at Washington, some time ago, and they sent me a journal called *Health and Science*, in which was published the temperature and humidity at almost every important point in the United States. They also published a table showing the kinds of diseases prevalent at each of these points, and if you will give me the death rate from consumption at any point, I will take that table and show you the average humidity per annum. In other words, at the seacoast and throughout the Ohio and Mississippi Valleys, you will find consumption prevalent, but in the dry climates of Montana and New Mexico the disease is almost unknown. I have a letter from the gentleman who is Director of the Department at Washington, saying in his opinion diseases of the air passages are more common in moist climates than in dry ones, and he gave authority and evidence to show that he looked it up very carefully. I have noted the fact particularly that on a moist day every man's head is down this way (indicating), but when the air is dry you will find heads erect and every man feeling good. Animal life is buoyant in a dry, clear atmosphere, and correspondingly depressed in a moist atmosphere.

Mr. Butterworth—That is due to the fact that the air is heavier in clear weather than in damp weather, and therefore more supporting and bracing. It is the gravity of the air that makes us feel buoyant.

Mr. McDonald—I introduced this subject of dry heat, for the reason, I think, it is one of the most palpable misnomers in the world. People will complain of dry heat when they are almost in a Turkish bath, and my object in putting these facts into a clear statement that a schoolboy can understand, is an attempt to eliminate from the mind of the people that the use of a good gas heater has nothing on earth to do with it; and I have laid it before an Association of this sort, so that if these statements were not true, and our friends who make gas heaters read them, they can can challenge them or admit that these statements are true and work accordingly, instead of going around selling their gas stoves on the alleged claim that they will do things that are not worth doing in the first place. Most of the gas stoves on the market only differ from each other in the name and nickel plating.

Mr. Doherty—I really did not think the products of combustion, as stated in the paper, were particularly harmful. I never had the question of moisture brought up. I always thought carbonic acid gas and the products of incomplete combustion were claimed to be harmful. Mr. McDonald has sprung something new on me. I never thought water was very harmful. I often thought if some of my friends would take a little more of it it would be better for them.

Mr. Jenkins—I will interrupt Mr. Doherty by calling his attention to the fact that Mr. McDonald lives in Kentucky. (Laughter.)

Mr. Doherty—I take it all back. Now as to what Mr. McDonald says about the price of a heater. Of course, if we can throw the products of combustion off and lose no great amount of heat, it is to our advantage to do so, because there will always be more or less prejudice against throwing the products of combustion right into the room. Some rooms require so much gas for heating them that the products of combustion are objectionable; but the stove is too often selected because of its cost and the amount of nickel plating it carries, and the proper thing for some one to do, who belongs to some Gas Association, is to certify what is a good stove, or offer some premium or something of that sort, for the construction of a stove that has some other point of merit besides its artistic appearance and its cost; and what I would like to see this Association do, if somebody would be willing to make a motion, is to appoint a committee to pass on stoves that are exhibited at our next meeting, and, after making a careful test of them, give to the owner of the most successful, a premium or certificate of the fact that he had the most efficient and best equipped gas stove, which award would be compensation enough to him for getting it up.

Mr. McDonald—I would suggest to Mr. Doherty, in that shape the committee would have a month's hard work on hand, because there are so many stoves. If you would limit it to the stoves which put their products of combustion up a flue, and not in a room, you would only have two or three to choose from, and they would probably be good ones. In other words, the manufacturers would have to get up something to meet that demand; and if you gentlemen will let them know that there is such a demand, and that they can get two or three dollars more for a heater which puts out nothing into the room than they can for one which puts exerything into the room, the supply will follow the demand.

Mr. McIlhenny—With relation to humidity of atmosphere and its relation to lung trouble, another aspect of the case seems to me to have more bearing upon it than the mere fact that the air may contain an extra amount of moisture. As the speaker said awhile ago, on the seacoast and throughout the valleys of the Ohio and Mississippi there is a great proportion of lung trouble, and also in those places there is a larger proportion of moisture in the air. I believe it is admitted that the air in the valleys and in low places is more highly charged with oxygen than the atmosphere in a more rarefied climate. That is to say, a man has to take into his lungs a smaller amount of air to get a certain amount of oxygen than in a high climate. The trouble is, in low places people do not use the entire lung space. It is not necessary for them to take in as large a volume of air to get the revivification of the blood, and consequently a small part of the lungs is not used at all, and that is the cause of lung trouble and consumption. The entire lung capacity is not required, and we all know when any part of the physical structure is not employed, that particular part will deteriorate and be subject to disease. The man who lives in the high climate has to open his lungs out to their full capacity, to take in the requisite amount of oxygen, and consequently all the lung capacity is employed and he is not so subject to lung disease. We know that men of vigor, and people who breathe well, do not have lung trouble, no matter how moist the climate may be. I think the trouble is more due to the fact that the entire lung capacity is not employed, than to the fact that there is moisture in the air. It is also a well-known fact that there are moist places where people live, and live well and live happily. On this question of the amount of moisture in the air produced by gas consumption I think there has been considerable exaggeration. There may be other causes. I believe it is not the moisture, it is the effluvia following expiration of the air carrying matter from the lungs. If that air is carried away and no effluvia, there is no trouble I believe. And it has also been shown that it is not the proportion of carbonic oxide gas, or carbonic acid in the room, or carbon bi-oxide, which renders the atmosphere unhealthful. It is perfectly neutral. I have heard a distinguished professor of physiology and physics say that 25 per cent. of carbonic acid was not necessarily fatal. It is the other matter carried along with the carbonic acid that is troublesome and not the acid itself. It is absolutely neutral. It can do you no harm, provided you get enough oxygen at the same time to carry on the respiration. Looking at the other side, might we not say, having had considerable objection to the air of the room and all that sort of thing, that, by putting a certain amount of acid in the room, we would make the people open their lungs more fully, and consequently have them employ and utilize these unused parts which have been in disuse so long, might we not say, "all hail to the gas stove that makes people breathe." (Laughter and applause.)

Mr. McDonald—I will admit right off what Mr. McIlhenny has said as to dense air requiring less deep breathing, and rarefied air requiring deeper breathing. It is also true that a dry climate is good for that class of troubles, even where it is not a high plateau where the ordinary barometric pressure rules. It seems to me it is very much easier, however, to do a little sheet iron work, and make a good stove, than it is to convince people that they ought to drink 25 per cent. carbonic acid gas. Another thing, I read the experience of the scientific gentleman to whom the last speaker has referred, and will say to him that those people did not die at all, but, on the contrary, *after being carried out into the open air they soon revived.* (Laughter and applause.)

Mr. Cline—I understood Mr. McDonald to remark that he had found this perfect stove, and all that was necessary for the gas fraternity to do was to recognize it and it would be put on the market. I would like to inquire where it can be obtained.

Mr. McDonald—I will say that there are two or three stoves (one in Cleveland, another made in Chicago, and a third in Louisville) which I have made myself to a certain extent, and which partly meet this problem. I do not say any of them are anything like what they ought to be, but in talking the matter up with manufacturers, and endeavoring to get them to further perfect their stoves, I am met all the time with the fact that the people do not care one cent about the products of combustion, and will not pay one cent more for a stove, such as I have suggested, than they would for the ordinary stove. If they will not it

is simply ignorance, and it is the business of you gentlemen to dispel that ignorance, and that is why I read before you this paper to-day. The stove can be made if you will educate the people up to a due appreciation of the kind of stove which will give the best results in this regard.

Mr. McIlhenny—It is only proper to say that Mr. McDonald should receive every commendation for the suggestions in his paper, and particularly with reference to the necessity for improvements in the gas stove. We all admit there is not a stove on the market to-day (at least a stove which is in a tangible shape) that meets all the requirements, and it would be well if we would encourage the stove people to put such an article on the market. I have talked with quite a number and advocated the making of a stove which gives more surface and which affords a large volume of mild heat instead of a small volume of hot air; but they say, "We lose money in our experiments, and we have to make the kind of a stove that the people want; and we make anything that people want." Of course, we can hardly expect them to do otherwise, and the thing for us to do is to advocate the use of the stoves which we believe to be the most efficient and the best for people to use. I saw, in a discussion before one of the English Gas Societies not long ago, a report from Germany, where they are far more advanced in the use of gas heating stoves than in England. Stoves are made there which lose comparatively little heat, though I think they are very much larger stoves, with ample surface, so that all the heat employed has a chance to get away, and it was employed in a way that the heat was converted, rather than radiated, and we all know that this is the most powerful method of heating. I do not know that we can exactly advocate the suggestion made by Mr. Doherty, for we will have untold trouble on our hands if we attempt to pass on every stove. It would require a great deal of labor and be a very delicate operation, yet I think that, in the capacity of gas companies, we should do everything we can to get the stove people to make for us a satisfactory stove, and when they do that we should do all we can to cause them to adopt it.

Mr. McDonald—Mr. Doherty's suggestion does not strike me as impracticable. If you inspected all of the gas heating stoves you would need a room bigger than this to accommodate a sample of each kind that is made, but if you limit it to gas heating stoves, which should put into the room not one particle of the products of combustion, which should do their heating without getting red-hot themselves, and which should be sufficiently substantial in construction, not to be destroyed by their own heat, which is an important point and one frequently overlooked, you would have but three or four samples, and they would be from the wealthiest and most influential manufacturers in this country; and the little free advertising that the winner in such a competition would get would more than repay him for the time and trouble, and it would thus very materially advance the interests of companies who have gas for sale as fuel.

Mr. Jenkins—This is an extremely valuable paper, and I think this Association appreciates the last two or three years of Mr. McDonald's labor upon this line. We can all join in a hearty vote of thanks to Mr. McDonald for the very valuable paper and the excellent service he has rendered to us all. (Seconded, carried.)

Mr. McDonald—Gentlemen, I am fully paid off.

Again, the Question Box.

The President—The next thing in order will be to finish up the Question Box. Question No. 11 is:

> "What is a fairly simple, moderately effective and comparatively inexpensive test (beyond that of a hydrometer for gravity only and short of actual use), applicable by a gas works superintendent, for determining the relative values of the various kinds of gas oils for water gas making, or for checking off the goods received from shippers?"

Mr. Watt—I do not think there is any other test, because gas oil is composed of the different gravities. Although composed of oils of different gravities, yet they can be brought up to the same gravity by the use of different ingredients. So the only effective test that can be employed is by spending about 12 to 15 hours in getting a fractional distillation.

The President—There are very few light oils in their composition; mostly heavy oils?

Mr. Watt—Yes, sir.

The President—Mr. Thompson, we would like to hear from you on this subject.

Mr. Thompson—One way in which that can be done to some degree of certainty is to compare one shipment of a given oil with a later shipment of the same oil, by driving off the vapors and all like products in a wide, shallow pan, by means of a gas stove or any other similar convenient arrangement, and finding the quantity of residuals, and weighing it and comparing it with the original weight of the oil; and, in addition, taking a sample of the original oil and subjecting it to a lower temperature by means of pounded ice and salt, and noting the temperature at which it solidifies. A comparison can be made between different shipments of oils on that basis in a very few moments and at comparatively little expense. It will be satisfactory as far as one shipment compares with another shipment of the same oil.

The President—Question No. 12 is:

> "Does anyone know of any methods of purification in use in the United States other than the various oxide, or sponge, or dry lime methods?"

Mr. Templeton—I have seen a machine at the South Side Works at Pittsburgh that proposed to use lime water, but it was not in practical operation. They claimed they made some tests, and it could be done, but it would be more expensive.

The President—That is the old "Blue Billie" style, as it used to be called.

Mr. Doherty—Almost every gas works uses something else in a measure, and that is a "Standard" scrubber. Anything that the ammoniacal liquor comes in contact with, we have to use the same means that we use our purifiers for, in order to obtain the proper purification, and it is only a question of how far it will carry that out, and to what degree.

The President—Question No. 13 is:

> "What causes, and who can suggest a remedy for, the deposit of naphthaline?"

Mr. Jenkins—I have had some experience with naphthaline, and have reached the conclusion that it is caused by high heats and the too sudden cooling of the gas. I think the experience of the gas companies in this section last year will bear me out. A number of years ago, in Columbus, Ga., they were sending gas, through a steam jet exhauster, into a scrubber with cold water, and had naphthaline that they *could not burn*. Later on, in Covington, Ky., they were doing pretty nearly the same thing, only they did not have the steam jet exhauster. Last year the Covington folks had a great deal of trouble with naphthaline, and I put in a small horizontal pipe condenser, of ample capacity, and condensed or cooled the gas gradually to a normal temperature, and then passed it into the scrubber. While I was getting ready this apparatus we noticed a decrease in the amount of naphthaline; since it was put in working order we have not had a single instance of it. I think these two cases have been sufficiently demonstrative to show that it is a question of too sudden cooling. In Covington we have steam in our purifying house, and, if we can possibly avoid it, we do not allow our gas to go below 52° or 54°. If you let your gas run down 20° or 30°, and then pass it on through your apparatus, you will have naphthaline; that is, if you bring it over from your retorts and drop it down suddenly, I think that will account for the trouble. Last year we had extremely cold weather through this section of the country, and as our purifying house was not properly heated with steam the temperature was very low.

The President—How is it, Mr. Jenkins, where you have a deposit of naphthaline a couple of miles from the works?

Mr. Jenkins—That you cannot account for. Once it gets started you never know where it is going to stop; it is liable to catch you right next to the gas works, or at the farthest lamp post, and I am at a loss to know why that is, unless it happens in an extremely cold and exposed place, or that there is some other special reason for it. But it will occur sometimes in one particular part of the town, where you will have it right along; again, you will have it on the other side of the town, and can assign no reason for it in either place.

Mr. Thompson—In regard to two points made by Mr. Jenkins, I might add, in visiting some 35 gas works in Great Britain, I found two works that were having difficulty with naphthaline. One, I think, was at Tunbridge Wells, where a steam jet exhauster was in use, and the other was at Ramsgate, where they carried the inlet pipe to the holder down inside the wall—that is, subjecting the gas immediately to the low temperature of the water, without carrying it down through the ground below the tank wall.

The President—Question No. 14 is:

> "Have any of the members used the 'Bahret,' the Crighton, or any other device for operating the four purifying boxes at the same time? What was the gain, or advantage over the usual manner of working the boxes?"

Gentlemen, I will answer this question. We have a center seal in use at the Steubenville works, where we use four boxes, and the advantage is an increase in purifying capacity of 33 per cent. In other words, we can use four boxes instead of three, and the only time the boxes are out of use is while we are changing material, the short time in which the material is prepared; so that it practically increases our purifying capacity, at a nominal expense, 33 per cent., and it is working very successfully. You can either work one, two, three or four boxes. The expense of an 8-inch center seal is $150. Question No. 15 is:

"Where should the tar extractor be placed?"

Mr. Butterworth can answer the question.

Mr. Butterworth—Close to the hydraulic main.

The President—After the exhauster, or before it?

Mr. Butterworth—Before it, probably; if the exhauster is far enough from the main.

The President—Question No. 16 is:

"Does the water line on a meter prover raise as the holder descends; if so, does the scale reading indicate the exact volume of gas discharged?"

Who can answer that?

Mr. McIlhenny—In reply I would say that the rise in the water line, due to the descent of the float of a prover, is very slight and only amounts to the displacement caused by the shell of the float, which is relatively thin and hence occupies very little bulk itself. Even if there is a slight increase in the water line it does not at all affect the proving of the meter. As the meter prover is itself tested by means of a cubical bottle, 1 cubic foot being put into the float at a time, and the proper division of the scale made for each foot, this would correct any change in the water line, which in any event would be insignificant.

The President—Question No. 17 is:

"What argument can be presented in favor of municipal control of lighting plants?"

Several Members—None.

The President—Does any gentleman wish to answer the question?

Mr. Butterworth—It would satisfy a certain element of society.

The President—Question No. 18 is:

"What arguments can be presented against municipal control of lighting plants?"

Several Voices—Every argument.

A Member—Haven't time to specify them this session.

The President—Question No. 19 is:

"For his own protection, should not every gas manager use his influence with his representative in the State Legislature, against the State operating lighting plants in its various hospitals and State buildings?"

Mr. Doherty—All the asylums at Columbus have asked for appropriations to put in electric plants, and most of them have gas plants now; but it seems to me that the proper thing for gas men to do is to use every effort to prevent the installation of electric plants. There are other places where it will hurt the gas interests if this is allowed. It will not hurt us materially in Columbus, because they are making their own gas. It may be far distant, but then it would be to the interests, I think, of the gas men to prevent this step if possible, and if anybody can head that movement off the effort should be well paid for by the gas fraternity.

The Secretary—One of the principal objections to this course of procedure is the fact that in their reports they send out false figures in regard to the cost of making light which induce the owners of wholesale factory buildings in other towns, or large dry-goods stores, to put in isolated plants, and in that way they do a great deal of injury all over the State.

Mr. Penn—I think as taxpayers we ought to oppose it.

The President—There are some other questions here which I will read:

"What, if any, improvements have been made in the Welsbach burner in the past year, especially in the durability of the mantle?"

Mr. Doherty—I do not know that any marked improvements have been made in the Welsbach burner during the last year. I will say, however, that the last two or three batches of mantles we have received appear to be much better than those we were in the habit of getting. They are more uniform and seem to be a better quality of mantle. The last batch of mantles we received about three weeks ago were uniform in their make up.

The President—I understand since the 1st of February that they claim a marked improvement in their mantles, and that they are now sending out the best mantle that they have ever made.

Mr. Doherty—It is certainly the best shaped mantle that they have ever made; the most uniform, anyhow.

The President—The mechanical construction of the burner has been greatly improved and is a great deal nicer than formerly.

Mr. Doherty—The artistic appearance is much better. Having sold all of our No. 31 marks, we ordered 1000 No. 34 lights. We are about to order again, but I do not think I will recommend the No. 34 light, which is the most recent light, but I will recommend that the No. 31 lamp be ordered.

The President—The next question is:

"At what price per ton can calcium carbide be produced?"

Several Voices—We do not know.

The President—The next question is:

"What is the best manner of constructing holder tanks, above or below the ground?"

Mr. Templeton—I think it depends upon the location entirely, and the kind of ground.

Mr. Jenkins—I understand, I think on pretty good authority, that one costs about the same as the other, so far as the tank is concerned, and it is simply a matter of local condition.

Mr. Gregory—I would like to inquire whether anyone can give any idea as to the average life of a tank, built above ground?

The Secretary—I do not suppose an above ground tank has been built long enough to tell.

Mr. Doherty—That would come in I should think under the head of bridge engineering. If the gentleman will ask the question of some bridge engineer he could probably give him more accurate information. I should think it would depend a good deal upon the care it received; whether the outside was painted regularly and whether the right kind of paint was used, etc.

The President—The next question is:

"What can be done to improve the market for gas house coke?"

Mr. Doherty—I believe I asked some one to put in such a question, and although I do not know whether this is the question or not it seems to me something ought to be done with it. There are ways of working up local trade, and every company is more or less interested in this subject, because a great many companies are putting all their surplus into somebody else's territory, and I thought that some of our talented members perhaps might get up a plea, in circular form, for gas house coke, so that the rest of us could avail ourselves of it, suggesting some further uses to which it may be put.

Mr. Templeton—The Keystone Coal and Coke Company of Chicago, will take all your surplus coke.

The President—None of you would ever admit that you have disposed of your surplus in this way, even if you had, I suppose.

Mr. Allen—I wonder how it would do to start a co-operative coke plant as we did a co-operative coal tar plant?

Report of Committee on Next Place of Meeting.

The President then called for the report of the Committee to name the next place of meeting; and Mr. Holmes, on behalf of the Committee, said: The Committee appointed to select a place for the next meeting of the Association, beg leave to report that they have received a cordial invitation to go to Youngstown, O., and a promise that ample accommodations will be afforded there. Some expression was also made in favor of Cleveland, and the Committee desire to recommend that the selection of the place be made between these two points, and to be decided by the vote of the Association.

Mr. Watt—In order to bring the matter before the members, I move that the Association hold its next annual meeting at Cleveland, O. (Seconded.)

A standing vote was taken on the motion, and it was found that there were 27 yeas and 9 nays.

Report of Committee on Memorials.

The President—We will now hear the report of the Committee appointed to draft resolutions in regard to deceased members.

Mr. Butterworth presented the following report of the Committee:

Your Obituary Committee submits the following report:

As stated by our President in his address, we have lost by death, during the past year, four members of this Association, namely, A. B. Maguire, H. Padan, Robert Sherrard, Jr., and E. S. Funnell.

A. B. Maguire was, for the last three years of his life, Secretary of the Urbana (Ohio) Gas Light Company. He was born at Port Jervis, New York, and died April 18th, 1895, aged only 27 years, at the begin-

ning of what promised to be a useful, honorable and successful business life. Both his parents survive him—his father also having been in the gas business. Those who knew him speak in the highest possible terms for his worth as a man and for his efficiency as an officer of the Company which he served.

Henry Padan was a native of Portsmouth, Ohio. He acquired a common school education and began his business career in an humble position in his father's shoe factory, in Portsmouth. He followed the shoe business throughout his lifetime, and succeeded not only in his business but also in acquiring the highest confidence and esteem of his fellow townsmen. This fact, together with his sterling qualities and good judgment, commended him for the Presidency of the Portsmouth Gas and Electric Light Company, to which position he was elected nine years ago, continuing therein until his death, which occurred very suddenly, September 30th, 1895, in the 46th year of his age. He was much interested in this Association and frequently attended its meetings.

Robert Sherrard, Jr., was for the past ten years President of the Steubenville (Ohio) Gas and Electric Company. He was born on a farm in Jefferson county, Ohio, in 1823. His education was obtained in the common schools. He taught school and practiced law in Steubenville, finally embarking in the banking business, which he followed until his death, which occurred at Steubenville, November 8th, 1895. He was a member of the Ohio Legislature in the early sixties, afterwards moving to New York city, where he was financial agent of the P. C. & St. L. Railway Company and President and Manager of the New York Transfer Company. He returned to Steubenville in 1874. At the time of his death he was President of the Board of Trustees of the Massillon asylum for the insane. He attended the meetings of this Association whenever possible, was a hard worker, and put his whole soul into any enterprise in which he was interested. He was kindly and affectionate in his dis position, and his death was a severe loss to his community and to the whole State of Ohio.

Mr. E. S. Funnell was born in England, in 1829, and came to this country when he was 12 years old. After engaging in other business for a number of years, he finally entered the employ of Messrs. D. McDonald & Company, gas meter manufacturers, at Albany, N. Y., in 1866, for which Company he travelled for 17 years. While so engaged, his services to the gas companies and to the gas industry of this country, in the way of conveying information from one company to another, before the days of Gas Associations and Gas Journals, in giving gas men confidence in each other and paving the way for more friendly interchange of knowledge, were such as to entitle him to the deepest gratitude of all gas men to-day; and no tribute to his memory is too high for us as gas men to pay. The formation of Gas Associations and the advance of the gas business generally would have been much slower in this country had it not been for Mr. Funnell. He was exceedingly genial; he was good company and well informed. Owing to an injury received while he was young he was almost helpless for the last six years of his life, but never complained and remained patient until his death, which occurred July 27th, 1895. He was elected to honorary membership of this Association at one of our early meetings.

Whereas, We recognize that, in the death of these four members, our Association has suffered a deep felt loss; and,

Whereas, We feel that a proper testimonial of our sense of sorrow should be preserved; therefore,

Resolved, That this report be spread upon the minutes, and that copies thereof be transmitted by the Secretary to the families of our deceased members with assurances of our deepest sympathy.

IRVIN BUTTERWORTH,
GEORGE W. MCCOOK,
DONALD MCDONALD (Albany, N.Y.) } Committee.
W. W. PRICHARD,

On motion, the report was accepted and placed on file.

REPORT OF COMMITTEE ON NOMINATION OF OFFICERS.

Mr. Butterworth then submitted the following report from the Committee on Nominations:

Your Committee, appointed for the purpose of nominating officers for the ensuing year, beg leave to report the following:

For President—Jerome Penn, of Washington C. H.
For Vice-President—W. C. Boyle, of Salem.
For Secretary and Treasurer—A. P. Lathrop, of Columbus.
For Members of Executive Committee—George Whysall, of Dayton; Daniel R. Warmington, of Cleveland.

ELECTION OF OFFICERS.

On motion of Mr. Allen, duly seconded, the report was adopted, and Mr. McCook was authorized to cast the ballot of the Association for the officers recommended in the report just received. Thereupon Mr. McCook, on behalf of the Association, cast the ballot of the Association for the officers nominated, and the same were declared duly elected.

VOTES OF THANKS.

Mr. Jenkins—I move a hearty vote of thanks to the President and Secretary of this Association and to the other executive officers thereof, for the interest, energy and zeal which they have manifested in securing so successful a meeting of this Association. (Seconded.)

Mr. Jenkins then put the motion to the house, and the same was unanimously carried. (Applause.)

The President—Before adjourning I wish to extend my thanks to the entire membership of the Association, and especially to the retiring officers, who have assisted me, and particularly to the Secretary, for his assistance during the past year. Before we adjourn, we would like to hear from the newly elected President, Mr. Penn.

Mr. Penn—I have only to state that I feel highly gratified for the honor conferred upon me in your electing me to the Presidency of your Association for the ensuing year, and I certainly hope that I will succeed in making the coming year one of profit to the gas interests of Ohio. I ask the hearty support of all in trying to make the sessions of the coming year one of the best Association meetings ever had in the State. (Applause.)

The Secretary—I move that a vote of thanks be extended to the Cincinnati Gas Light and Coke Company for hospitalities extended to this Association during this meeting, and to the Covington Gas Company for the courtesies about to be extended. (Adopted unanimously by a rising vote.)

On motion the convention then adjourned *sine die*.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. ADAM WEBER, proprietor of the Manhattan Firebrick and Enameled Clay Retort Works, of this city, informs us that he has been awarded the contract for the construction of a new stack of 12 benches of 6's at the works of the Brookline (Mass.) Gas Company. He will also construct for the Cambridge Gas Company, of East Cambridge, Mass., 6 benches of 6's. In both of the named installations the firing will be carried out under the Weber recuperative system.

THE Pottsville (Pa.) Gas Company has been awarded the contract to light the local court house and jail for the ensuing year, at its bid of $900—$600 on court house account and $300 on jail account. The Edison Electric Company's bid was $915.

MR. JAS. W. PATTERSON, official gas inspector for Allegheny county, Pa., in his annual report of the doings of his department for the past year, says that $3,521,700 is invested in the illuminating gas business of Allegheny county, and that the Companies are selling gas at lower prices than those ruling elsewhere in the State. Based on the gas supplied to the public by the Pittsburgh Company during the past year—430,977,000 cubic feet—the Companies in operation in the county have approximately distributed to their customers during the year, 839,000,000 cubic feet of gas. These Companies supply 22,584 patrons, an increase of 837 over last year. This shows a steady growth of the business. The minimum power of the gas supplied in the county was in excess of 16 candles—the standard—the maximum was 22.54 candles; the average was 19.95 candles. Referring to the acetylene developments the inspector says: "It may not be out of place to refer briefly to the new illuminant known as acetylene, which was exploited in the daily papers early in 1895. With seemingly more zeal than judgment, it was proclaimed as the coming illuminant. Experience has not proved the claims, and the best minds differ in opinion as to its utility and safety." Commenting on the attention being given to the matter of saving the bye-products resulting from the working of coke ovens, Mr. Patterson says: "I find that in Pennsylvania, in 1895, the gas wasted in making coke amounted to 43,070,000,000 cubic feet, while the combined product of the gas works of the cities of Pittsburgh, New York, Chicago, Philadelphia, Brooklyn, Baltimore, Boston, St. Louis, Washington, Cleveland, Milwaukee and Buffalo, during the same period, was 20,153,000,000 cubic feet of gas, or, in round numbers, about twice as much gas was wasted in the coke regions as the gas works of those cities produced. If these figures are approximately correct, and the processes of using the bye-products being tried turn out a success, then indeed we are on

the eve of a revolution in the manufacture of gas." During the year, 2,012 gas meters were inspected. Of these, 1,506 were new, 464 were repaired meters, and 42 were inspected on complaint of users.

TAX ASSESSOR CONNER, of Chattanooga, Tenn., in completing the revised assessment rolls of that city for the ensuing year, for purposes of taxation, has raised the valuation of the Chattanooga Gas Light Company's property and possessions to $126,000, from $55,000. The Assessor gives the following reasons for his action: "The increase is upon franchise and stock valuation; under the old tax law franchises were non-assessable, but the new law expressly provides for this, and as a result the assessment is increased and the corporations that have been enjoying free franchises will from this time on have to pay taxes upon them."

THE following is the new selling schedule of rates put out by the South Bend (Ind.) Gas Company, the same to rule from the 1st inst.—the gross is $1.50 per 1,000:

Monthly Consumption.	Net Rate per 1,000.
Under 1,500 cubic feet	$1 35
1,500 to 3,000 "	1 27½
3,000 to 6,000 "	1 20
6,000 to 10,000 "	1 12½
10,000 or over	1 00

The gross price under the old schedule was $2 per 1,000, and the discounts for prompt payment (within 10 days) brought the net price, qualified by the quantities used per month, to rates ranging between $1.70 and $1.20 per 1,000.

DURING the last week in March a special election was held in Hollidaysburg, Pa., for the purpose of determining whether or not the city should bond itself in the sum of $15,000, the money so raised to be devoted to the purpose of building an electric light plant to be operated on municipal account. The vote was in the affirmative.

THE Topeka (Kas.) *Capital* says that Mr. William Tracy and other residents of Leavenworth, Kas., have arranged to purchase the gas and electric lighting plants of the Salina (Kas.) Light and Power Company.

SUPERINTENDENT JOHN MOON, of the Carbondale (Pa.) Gas Company, is our authority for the statement that that plant will be reconstructed this summer, and that the system of manufacture will be changed from the coal to the water process. It is estimated that $20,000 will be expended under the betterment plan outlined.

MR. MEEDS, official gas inspector for Minneapolis, Minn., in the statement of the workings of his office for the month of March, reports that the average (25 tests) illuminating power of the gas supplied was 23.97 candles. The tests for purity showed that the gas was well within the conditions prescribed by the statute; although in one instance the presence of sulphureted hydrogen was detected. The specific gravity of the gas averaged .519. Five consumers' meters were tested, on complaint, of which four were shown to be correct, and the fifth was condemned.

IN the matter of the petition of certain residents of Montreal, Can., who asked the Court to set aside the agreement between the City Council and the Montreal Gas Company, under which the latter was empowered to supply gas to the city and to the citizens thereof for a term of 10 years, under certain stipulations as to price and quality (which stipulations have heretofore been published in the JOURNAL), the Court (through Judge Archibald) decided in favor of the Company. A summary of Judge Archibald's opinion is appended:

"Seeing the petitioners allege that they are electors and taxpayers of the city of Montreal, and have a right, under Section 144 of the charter of said city, to ask for the annulment of any resolution of its Council, on the ground of illegalities; that they also allege that the resolution of the city of Montreal, passed on July 16, 1895, whereby the report of the Light Committee of said Council, recommending a contract to be granted to the Montreal Gas Company for the lighting of the streets of the city, and the supply of gas to the citizens thereof for a term of years, upon conditions contained in said report, was and is illegal, and *ultra vires* of the said Council, because it binds and obliges each and all citizens of said city, desiring to use gas as an illuminant, to pay for the same certain sums referred to in said resolution, for a period therein named; because the city has no right to fix a rate on gas for private citizens, nor to fix a maximum rate as a condition of their contract, nor in any way interfere with private rights in this respect, because the city's power to regulate the streets does not enable it to make contracts for the supply of its inhabitants, which would be absolutely binding upon the city and its inhabitants for a fixed term of years, inasmuch as it cannot grant to any person or corporation the use of the streets of the city, for the purpose of laying gas pipes for a term of years, and inasmuch as it cannot oust succeeding Councils of the right to allow, in future, the use of unoccupied portions of the street for similar purposes.

"Seeing that the respondents deny petitioners' allegations. Considering that the resolution of Council referred to and attached by petitioners, does not oblige any citizens of Montreal to purchase gas from the Montreal Gas Company, or to pay any particular price therefor, but only provides, as a condition, that the Gas Company be licensed to use the streets for the supply of gas; that it shall supply gas to citizens who demand it, at a price not to exceed a given figure. Considering that a contract for a term of years to a Gas Company, such as that referred to in the petition, upon the consideration that the Gas Company shall lay pipes and furnish gas to the citizens and light the public places of the city for prices in said contract named, is not a monopoly within the legal rendering of that word, and is not illegal, and is within the power of the corporation of the city of Montreal, under Section 4 of its charter. Considering that the city of Montreal is owner of the streets thereof, and that the Legislature has conferred upon the city government rights in said streets, such as belong to proprietors generally, subject thereof, is set forth in its charter and regulated by law; that the corporation of said city can legally grant an exclusive right for a term of years to lay gas pipes in said streets and furnish gas to the city and its citizens. Considering, therefore, that the petition is unfounded, the Court doth reject the same with costs distrait to respondents' attorneys."

MR. ENRIGHT, the Superintendent of the Meridian (Miss.) Gas Light Company, reports that the outlook for increasing the day output in that place is most encouraging. The Company proposes to sell stoves at net cost to itself, and to stand the cost of furnishing a service connection in the instance of those who, desiring to try gas for cooking, buy a range outright. Mr. Enright, to his credit be it said, is doing the best he can, in the face of circumstances that even the ordinary Mississippian would be slow to encounter.

MANAGER WILLIAMS, of the Santa Barbara (Cal.) Company, acting on the advice of Mr. E. C. Jones, the Company's Consulting Engineer, has accepted the new water gas plant constructed for it by the Western Gas Construction Company. The Company is now in position to manufacture 150,000 cubic feet per diem, and we hope it will be but a short time when the demand on it will oblige it to construct an additional set—either on the cupola system or the coal bench order.

HAVING obtained its pound of flesh from the proprietors of the Montreal Gas Company, the "Coates Gas Company" now seeks to drain the local authorities of the drop of blood injected by the aforesaid "Coates" into the municipal system when Coates and his coadjutors were spreading their net. In other words, the Coates projectors are suing the city of Montreal for the $15,000 deposited by them as a guarantee that they would "never" combine with anyone or anything respecting the gas supply of that city. Perhaps the "relics" of the Coates-King combination will be successful. Their "appeal" will be listened to, in any event, with curious interest.

IN connection with the above hints as to the gas supply of Montreal, perhaps the following matters of record, regarding the annual reports of the Montreal Gas Company, will be of interest. A striking feature of the annual statements is the fairness of truth in which they are couched; and in any event they are in remarkable openhandedness, contrasted with the old-time stories of Mr. Joseph, the Company's ex-President. President Holt, who submitted the annual statements, said: "There has been a slight increase in the amount of gas sold, and a further decrease in the leakage. There have been 8.33 miles of new mains, and 1,036 services laid during the year. The works and plant of the Company have been maintained in a high state of efficiency, and steam stoking and discharging machines were installed, which, working satisfactorily and economically, are doing away with much of the hard and severe labor heretofore done by the men. There have been 563 gas stoves installed during the year, and the use of gas for cooking and heating purposes continues to increase in a very satisfactory manner.

"Your Directors have to refer with regret to the death of N. A. Hurteau, Esq., who, during his time of office, devoted a large amount of his time and services to the interests of the Company; and, in accordance with the Act of Incorporation, the Board has appointed C. R. Hosmer, Esq., to fill the vacancy for the balance of the year.

"Your Directors recommend that it is advisable to make an issue of bonds, so as to dispense with borrowing from the banks, as has been the custom heretofore, and to provide funds for the necessary extension of the system, and have called a special meeting of shareholders to consider and ratify same.

"The balance sheet, for the year ending February 29, 1896, is as follows:

"*Dr.*

Capital stock	$2,997,704 00
Accounts, not collectable	600 00
Dividends unpaid	9,137 55
April dividend unpaid	149,885 20
Open accounts, amounts owing	6,587 64
Consumers' deposit account	19,258 00
Mortgage, Ottawa street property	14,500 00
Bonded debt account	393,412 44
Amount on loan	204,119 40
Land account, Hochelaga	57,237 65
Profit and loss account	268,873 93
	$4,121,315 81

"*Cr.*

Gas works, mains and lands occupied by works	$3,775,985 79
Coals on hand	51,158 78
Oil on hand	1,406 93
Coke, tar and ammoniacal liquor on hand	21,327 40
Iron pipe, tubing, etc., on hand	10,798 67
Meters in use and on hand	120,302 86
Retort account, bricks, etc., on hand	26,949 93
Tools in use and on hand	1,729 58
Lamp account	28,498 06
Oxide of iron on hand	390 00
Gas stoves, etc	8,056 61
Open accounts, amounts due	57,725 25
Horses and vehicles, etc	1,430 06
Cash on hand	15,555 84
	$4,121,315 81

"During the year the Company paid out, in wages and salaries, $82,710. For the general maintenance of works, wear and tear, etc., $29,681 was expended. The total of the working account for the year amounts to $348,890, making a balance of $318,558. The gas rent from street lamps was $11,908, and the expenses in connection with the maintenance thereof amounted to $5,239. The receipts from gas rentals on general account were $546,682."

THE Messrs. Waldo Brothers, of Boston, Mass., will hereafter act as Agents in the New England States for Messrs. A. Weiskittel & Son, of Baltimore, Md. The Messrs. Weiskittel have also opened a New York branch at 1,387 Broadway, between 37th and 38th streets, which store will be managed by Mr. C. F. Hetzel, Jr., formerly of the New York Gas Stove Company, which concern has been discontinued. The Messrs. Weiskittel invite their customers and friends to inspect the line of Fire King gas cookers and heaters on show in the New York shops, and those who call will be cordially received. The stock carried in New York of course, is only intended for the local trade, and out-of-town customers, save in the instance of the New England States, will forward their orders to Baltimore direct. The new catalogue of the Fire King goods will be mailed to all who desire it.

WE understand that the proprietors of the Consumers Gas Company, of Wilkes Barre, Pa., are about to increase the capital stock to $250,000, the money so raised to be devoted to plant betterment. The main system is to be extended and a new holder to be erected on Dana street, between the Lehigh Valley and the New Jersey Central Railroads.

MAYOR WARWICK, of Philadelphia, in his current annual message has this to say respecting the city's gas plant: "The receipts of the Bureau of Gas for the year 1895 were $3,155,956.47, the current expenses were $2,985,513.85, and for permanent improvements the sum of $54,589.59 was expended, leaving a balance of $115,853.03. If the city had paid for all the gas furnished free, if sold at the present rate of $1 per 1,000 cubic feet, there would have been added to the City Treasury $638,494. The gas works is one of the most valuable assets of the city. It has been valued, at a low calculation, at $30,000,000. It will be seen in the report of the Director of Public Works that there were expended for permanent improvements last year only $54,589.59. In order to keep these works up to a proper standard it will be necessary to make greater improvements, not only in the manufacture but in the distribution of the gas, and these improvements will compel a large expenditure of money. The gas is not of the quality that it should be, and there is no need of concealing the truth; it will not be until the necessary improvements are made that will enable the Bureau to manufacture and distribute a better illuminant. Some of the improvements now in process of construction, it is thought, will, in a measure, bring about the desired results. In my inaugural address I stated that the gas works should never pass from the absolute control and ownership of the city. The plant is too valuable, and history shows that whenever such a property passes into private hands it in time becomes an extortionate monopoly. During my administration I have seen nothing that tends to change my opinion as then expressed. In fact, I have been strengthened in my belief that the gas works should never be sold."

MR. FRED. H. SHELTON, Manager of the Chicago Retail Department of the Welsbach Commercial Company, writes us that he will be pleased to welcome to his headquarters, 67 Washington street, any gas men visiting Chicago, either on business or pleasure bent. It is proposed to carry on show in the Chicago shop the largest stock of Welsbach appliances and fixtures in the West.

THE United Gas Improvement Company has recently closed a contract with the Malden and Melrose (Mass.) Gas Light Company for one of its latest type of Lowe apparatus, equipped with reversed steam connections and iron operating floor. This set, which will have a daily capacity of 350,000 cubic feet, makes the 56th installation of water gas apparatus in New England by the United Gas Improvement Company.

THE Gray-McCauley syndicate takes possession of the Norristown (Pa.) Gas Company on May 15th.

ON the 4th inst. Judge Cole overruled the motion for a new trial made by the defendant in the case of Thomas G. Lansden against the Washington (D. C.) Gas Light Company, on the original trial of which plaintiff was awarded damages in the sum of $12,500.

UNDER the franchise granted by the authorities of Hammond, Ind., to the proprietors of the Interstate Fuel, Light and Power Company, for the right to operate a gas works in Hammond, the Company may charge the following rates: For illuminating purposes, $1.25 per 1,000; for fuel use, 75 cents per 1,000. Prompt payment (within 10 days) entitles the customer to a rebate of 15 cents per 1,000.

MR. H. W. SEXTON has been appointed Receiver for the Anniston (Ala.) Gas and Light Company, on the petition of the Mercantile Trust and Deposit Company, of Baltimore, which concern represents the holders of $125,000 of the Gas Company's bonds.

Coke Breeze Concrete.

The London *Journal* "notes" that in connection with a paper read by Mr. H. T. Hare before the Architectural Association, on the subject of "Municipal Buildings," some interesting observations were made by the author and others respecting coke or coke breeze concrete as a fireproof material. The author strongly recommended the extension of the fireproof construction to the roof as well as the floors; and he declared his preference for the oldest and simplest kind of such construction, consisting of rolled iron or steel joists, from 3 to 6 feet apart, with cement concrete filling covering the joists above and below at least 1 inch. Mr. E. W. Mountford, in discussing the paper, remarked that he had a partiality for using coke breeze concrete. On one occasion, however, breeze was expensive in the neighborhood where he was erecting a building; so the builder naturally wrote and told him that he knew from experience that coke breeze was a most inflammable material. He therefore had three specimen pieces made of coke breeze and cement of exactly the same quality and thickness as the floors were to be; and he put the three slabs, which were about 3 or 4 feet square, over a tremendous fire for three hours. At the end of this time, they were absolutely as good as when the fire was lighted, except that about ¼ of an inch was reduced to a sort of ash, which could be removed with one's finger. It was observed in the further course of the discussion that the London County Council will not now accept breeze concrete as a fireproof floor. Mr. W. D. Caröe, the President, also stated that he had seen coke breeze concrete become perfectly red hot in the fire, just like steatite stone. He did not know whether a material which could get red hot was necessarily a fireproof material; and he hoped Mr. Mountford would continue his experiments with it and publish the results. In reply Mr. Hare admitted that concrete made simply of coke breeze and cement is not generally supposed to be fireproof. Indeed, he knew of one case where the workmen on the building used it as fuel. Sand or ballast mixed with the breeze would, he believed, make it quite fireproof. A year or two ago he had some test blocks of breeze concrete made. One was of coke breeze and cement; another, coke breeze, broken brick and cement; and a third had a small proportion of ballast mixed with the coke breeze. He found that the strongest of the whole lot was a mixture of 5 parts of coke breeze and 1 part of ballast to 1 of cement.

The Market for Gas Securities.

The market is in about the same shape that it was a week ago, although it may be truthfully said that a greater feeling of security prevails in respect of city shares, Mutual in particular manifesting a rising tendency. Consolidated came in to-day (Friday) at 153 to 153½, and we are satisfied that the stock is a great bargain at those figures. Standard issues are fairly steady, but New York and East River shares are, and we think unaccountably, inclined to weakness. Brooklyn Union is 84½ to 85, and it is in the air that on the adjournment of the Legislature the Company will declare a 2½ per cent. dividend. The Company's business is remarkably prosperous. Chicago gas at noon to-day was 68¾. Consumers, of Jersey City, is bid 83, with a good prospect of a speedy rise in it. Lacledes are weak and dull. Cincinnati is strong, at 203 to 204½. Baltimore Consolidated is in good demand, at 66 bid, and the Company was never in better shape than it is at present. The impression prevails, too, that Congress will deal gently with the Washington (D. C.) Company.

Advertisers' Index.

GAS ENGINEERS.

Page

Jos. R. Thomas, New York City ... 601
Wm. Henry White, New York City ... 599
Fred. Bredel, Milwaukee, Wis. ... 595
H. C. Slaney, Brooklyn, N. Y. ... 599
Geo. R. Rowland, New York City ... 599
The Western Gas Construction Co., Fort Wayne, Ind. ... 590
Humphreys & Glasgow, New York City ... 586
T. G. Lansden, St. Louis, Mo. ... 599
American Gas Co., Phila., Pa. ... 583
David Leavitt Hough, New York City ... 580

CHEMISTS.

Herman Poole, New York City ... 581

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md. ... 597
United Gas Improvement Co., Phila., Pa. ... 589
Burdett Loomis, Hartford, Conn. ... 598
National Gas and Water Co., Chicago, Ills. ... 591
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 597
The Western Gas Construction Co., Fort Wayne, Ind. ... 590
A. M. Sutherland, New York City ... 581

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd & Sons, New York City ... 600
Continental Iron Works, Brooklyn, N. Y. ... 598
Deily & Fowler, Phila., Pa. ... 600
Kerr Murray Mfg. Co., Fort Wayne, Ind. ... 596
Stacey Mfg. Co., Cincinnati, Ohio ... 599
Bartlett, Hayward & Co., Baltimore, Md. ... 597
Davis and Farnum Mfg. Co., Waltham, Mass. ... 596
R. D. Wood & Co., Phila., Pa. ... 598
Isbell-Porter Company, New York City ... 598
Fred. Bredel, Milwaukee, Wis. ... 595
United Gas Improvement Co., Phila., Pa. ... 589
Berlin Iron Bridge Co., East Berlin, Conn. ... 586
National Gas and Water Co., Chicago, Ills. ... 591
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 597
The Western Gas Construction Co., Fort Wayne, Ind. ... 590
Humphreys & Glasgow, New York City ... 586
Gas Engineering Co., Pittsburgh, Pa. ... 596
American Gas Co., Phila., Pa. ... 583

SCRUBBERS AND CONDENSERS.

G. Shepard Page's Sons, New York City ... 599
R. D. Wood & Co., Phila., Pa. ... 598
James R. Floyd & Sons, New York City ... 600
Continental Iron Works, Brooklyn, N. Y. ... 598
Gas Engineering Co., Pittsburgh, Pa. ... 596

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md. ... 597
Fred. Bredel, Milwaukee, Wis. ... 595
J. H. Gautier & Co., Jersey City, N. J. ... 595
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. ... 594
Adam Weber, New York City ... 594

TAR AND CARBONIC ACID EXTRACTOR.

G. Shepard Page's Sons, New York City ... 599

AMMONIA CONCENTRATORS.

Michigan Ammonia Works, Detroit, Mich. ... 580
G. Shepard Page's Sons, New York City ... 599
Gas Engineering Co., Pittsburgh, Pa. ... 596

GAS METERS.

John J. Griffin & Co., Phila., Pa. ... 584
American Meter Co., New York and Philadelphia ... 603
The Goodwin Meter Co., Phila., Pa. ... 602
Helme & McIlhenny, Phila., Pa. ... 603
D. McDonald & Co., Albany, N.Y. ... 603
Nathaniel Tufts, Boston, Mass. ... 602
Maryland Meter and Mfg. Co. Baltimore, Md. ... 602
Metric Metal Co., Erie, Pa ... 601
Keystone Meter Co., Royersford, Pa. ... 602
The Hillen Meter Co., Brooklyn, N. Y. ... 603

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia ... 603
John J. Griffin & Co., Phila., Pa ... 584
D. McDonald & Co., Albany, N. Y. ... 603

GAS AND WATER PIPES.

Ohio Pipe Co., Columbus, Ohio ... 601
M. J. Drummond, New York City ... 601
R. D. Wood & Co., Phila., Pa. ... 598
Warren Foundry and Machine Co., New York City ... 601
Donaldson Iron Co., Emaus, Pa. ... 601
Addyston Pipe and Steel Co., Cincinnati, O. ... 601

PIPE CUTTERS.

Wm. Anderson, East Boston, Mass. ... 580

GAS BAGS.

Peerless Rubber Mfg. Co., New York City ... 580

STEAM BLOWER FOR BURNING BREEZE.

H. E. Parson, New York City ... 595

GAS COALS.

Penn Gas Coal Co., Phila., Pa. ... 598
Perkins & Co., New York City ... 592
Despard Gas Coal Co., Baltimore, Md. ... 593
Westmoreland Coal Co., Phila., Pa. ... 593
Berwind-White Coal Mining Co., New York and Phila. ... 592
Henry C. Scheel, New York City ... 593

CANNEL COALS.

Perkins & Co., New York City ... 592
Henry C. Scheel, New York City ... 593

GAS ENRICHERS.

Standard Oil Co., New York City ... 593
The Sun Oil Co., Pittsburgh, Pa. ... 593
W. H. Townsend, New York City ... 593

COKE CRUSHER.

C. M. Keller, Columbus, Ind. ... 593

CONVEYING MACHINERY.

C. W. Hunt Company, N. Y. City ... 581

GAS GAUGES.

The Bristol Co., Waterbury, Conn. ... 581

GAS GOVERNORS.

Connelly Iron Sponge and Governor Co., New York City. 591
Isbell-Porter Co., New York City ... 598
The Wilder Mfg. Co., Phila., Pa. ... 581

SELF-SEALING MOUTHPIECE DOORS.

Isbell-Porter Company, New York City ... 598
Continental Iron Works, Brooklyn, N. Y. ... 598
G. Shepard Page's Sons, New York City ... 599

RETORTS AND FIREBRICK.

J. H. Gautier & Co., Jersey City, N. J. ... 594
B. Kreischer & Sons, New York City ... 594
Adam Weber, New York City ... 594
Laclede Firebrick Mfg. Co., St. Louis, Mo. ... 594
Cyrus Borgner, Phila., Pa ... 594
James Gardner, Jr., Pittsburgh, Pa. ... 594
Henry Maurer & Son, New York City ... 594
Baltimore Retort and Firebrick Co., Baltimore, Md. ... 594
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. ... 594
Brooklyn Firebrick Works, Brooklyn, N. Y. ... 594

CEMENTS.

C. L. Gerould & Co., Mount Vernon, N. Y. ... 594

INCANDESCENT GAS LAMPS.

Welsbach Commercial Co., Phila., Pa. ... 583

MICA GOODS.

The Mica Mfg. Co., New York City ... 580

BURNERS.

C. A. Gefrorer, Phila., Pa. ... 598

LAVA GAS TIPS.

D. M. Steward Mfg. Co., Chattanooga, Tenn. ... 581

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Henry W. Douglas, Ann Arbor, Mich. ... 591

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Isbell-Porter Company, New York City ... 598
Connelly Iron Sponge and Governor Co., New York City 591

VALVES.

Ludlow Valve Manufacturing Co., Troy, N.Y. ... 590
Chapman Valve Manufacturing Co., Boston, Mass. ... 590
R. D. Wood & Co., Phila., Pa. ... 598
Continental Iron Works, Brooklyn, N. Y. ... 598
The P. H. & F. M. Roots Co., Connersville, Ind. ... 588
Isbell-Porter Co., New York City ... 598
The Western Gas Construction Co., Fort Wayne, Ind. ... 590

ELECTRICAL APPARATUS.

Wm. Henry White, New York City ... 599

GAS ENGINES.

Otto Gas Engine Works, Phila., Pa. ... 604
The American Gas Engine Co., Phila., Pa. ... 582
Backus Water Motor Co., Newark, N. J. ... 580

ENGINES AND BOILERS.

The Hazelton Boiler Company, New York City ... 580
W. G. & G. Greenfield, East Newark, N. J. ... 580

PURIFIER SCREENS.

John Cabot, New York City ... 595

GAS STOVES.

American Meter Co., New York and Philadelphia ... 587
The Goodwin Meter Co., Phila., Pa. ... 602
George M. Clark & Co., Chicago, Ills. ... 585
Maryland Meter and Manufacturing Co., Baltimore, Md. 602
William M. Crane & Co., New York City ... 584
Keystone Meter Co., Royersford, Pa. ... 602
A. Welskittel & Son, Baltimore, Md. ... 585

CHINA GAS KILNS.

William M. Crane & Co., New York City ... 584

GASHOLDER PAINT.

New York Marine Paint Co., Poughkeepsie, N.Y. ... 590

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
813 DREXEL BUILDING, PHILA., Mar. 26, 1896.

The Directors have this day declared a quarterly dividend of 2 per cent. ($1 per share), payable on April 15, 1896, to stockholders of record at the close of business April 1st. Checks will be mailed. EDWARD C. LEE, Treas.

Situation Wanted

As Superintendent of Gas Works,

by a young man of 10 years' experience. Competent in all of the departments, including office work. Has had experience in the building of water works and the operation of electric plants. Can furnish best of references. Has been Superintendent of a Gas Works for the past 10 years.

1088-2 Address "R. K.," care this Journal.

Position Wanted

As Superintendent of Gas Works.

Has been in the employ of the Passaic (N. J.) Gas Company for the last 10 years as Superintendent, and is a practical mechanic, thoroughly understanding the laying out and erection of plants and the making of coal and water gas. Seventeen years' experience as constructor and builder with John Hanlon, Gas Engineer. Best of references. Address

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A Second-Hand Wood's Condenser,

Capacity, 50,000 to 75,000 feet per day. Also,

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State price and condition. Address "A. H.,"
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6 ft. by 8 ft., 3 ft. deep, 18 inch Seal, 8 inch Connections.
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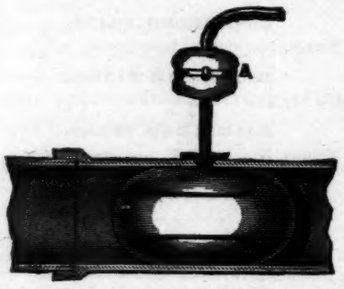

These Gas Bags are used to stop the flow of gas while repairing or making alterations in gas mains. There have been numerous cases of workmen being badly injured, and sometimes fatally, by the escape of gas resulting from the bursting of a bag, and our patent improvement is designed to obviate such calamities. The indicator *A* shows unerringly when the bag has been sufficiently inflated to pack the main, and when the pumping should be stopped. Our Bags are made of a rubber stock especially prepared to admit of great distension, and to resist the action of Oils, Gases, Naphtha and other residuum in the mains, and they are made with lapped joints, which adds greatly to their strength.

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4 "	"	"	.80	16 "	"	"	8.25
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6 "	"	"	1.75	24 "	"	"	17.00
8 "	"	"	2.65	30 "	"	"	27.50
10 "	"	"	3.75				

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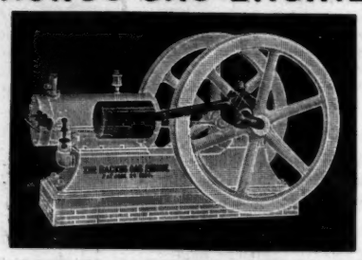

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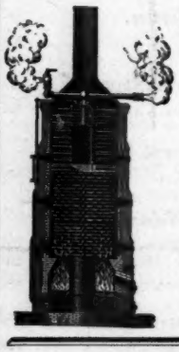

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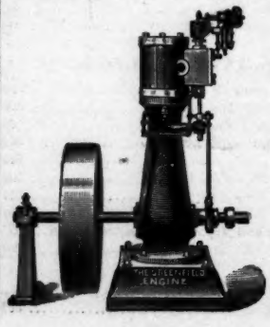

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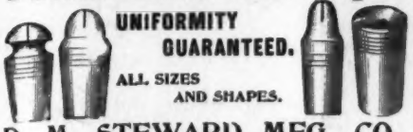

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For Continuous Records of
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Accurate in Operation,
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COKE CARS for Gas Works,
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INDUSTRIAL RAILWAYS
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The Most Economical, Efficient and Reliable
WATER GAS APPARATUS
In the World for Small to Medium Works.

Can be put into Coal Gas Works at a price the interest on which will not be so much as their present repair account.

This Generator is now in use in nearly every State in the Union, and everyone using it will recommend it to you.

It makes a faultless gas from whatever gas-producing materials are cheapest in the locality where required, using hard coal or coke in connection with Lima crude or any other crude petroleum or its distillates, including *Naphtha of any specific gravity.*

I build these Generators with any required capacity, from 3,000 cubic feet per hour upward.

In more than one half the gas works in the country the "Little Giant" will enable *one man* to easily make, in *five hours*, all the gas needed for the *twenty-four hours.*

If gas coal is very cheap and anthracite coal and hard coke very expensive with you, put in a Little Giant Generator, as many others have done, *to use up your surplus coke, and to rush up your holder when hard pressed.*

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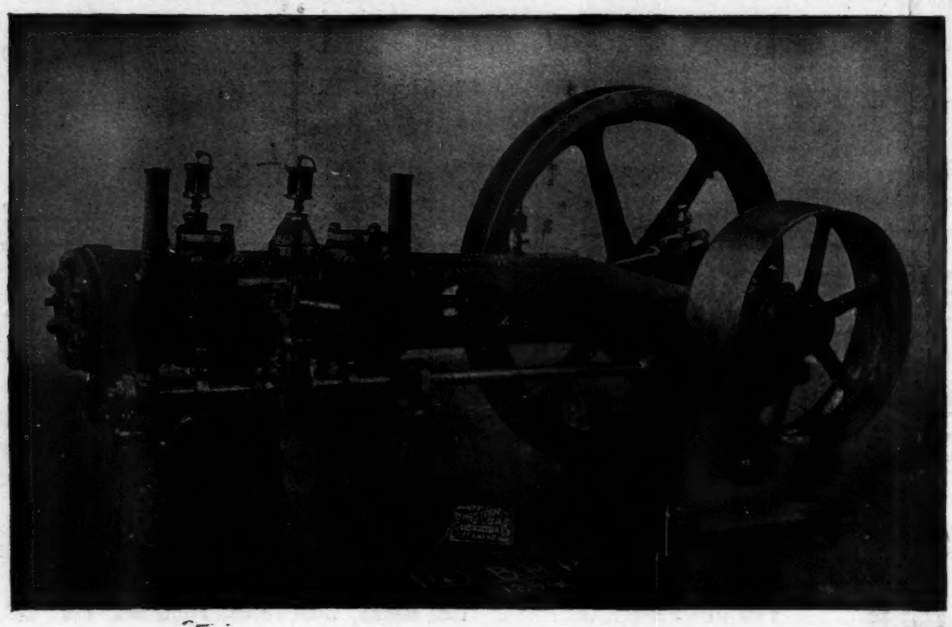
MANUFACTURERS OF

The Double-Acting Gas Engine,

Under the Patents of Griffin, and Dick, Kerr & Co., of London and Kilmarnock.



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Single Cylinder.

Impulse Every Revolution.

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15 to 500 Horse Power.

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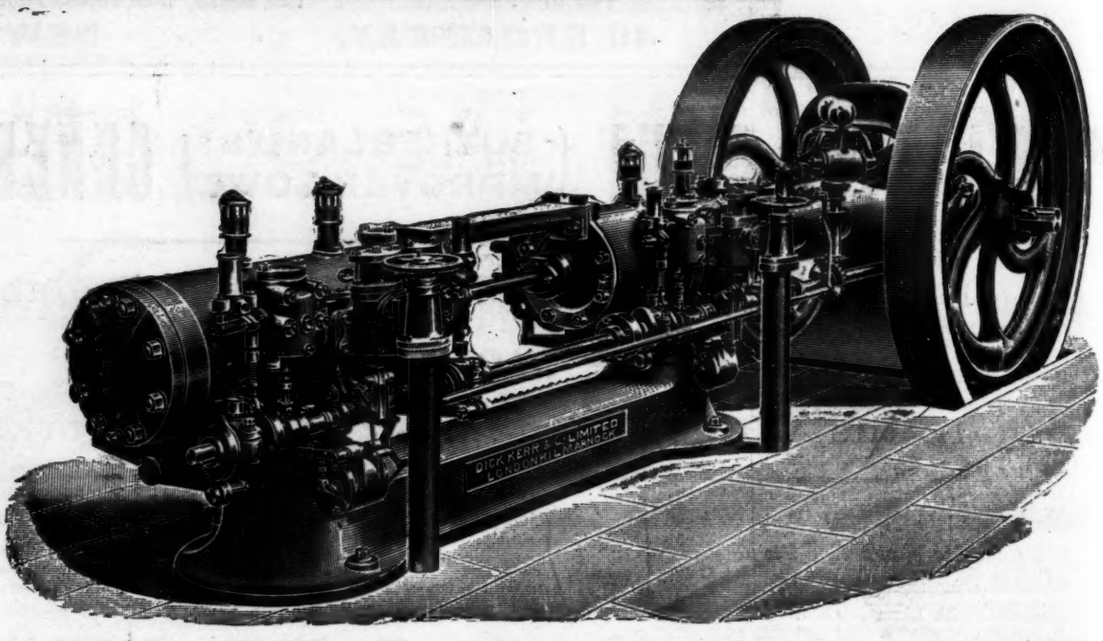
For Central Stations and all work requiring extreme steadiness.



ESSENTIAL PRINCIPLE.—An impulse at each end of piston; using half force to each impulse; doubling the steadiness; reducing the wear on moving parts, and weight for given power. **CONSTRUCTION.**—The piston rod works through stuffing box in front end of cylinder, and connecting rod is carried in a cross-head working in a slide in frame, as in ordinary steam engine practice. All valves are of the poppet type, operated by cams on a single cam-shaft, giving positive movement to every working part. Tube or electric ignition. **RESULT.**—An engine of extreme simplicity and steadiness of action, the even wear on the cylinder and all working parts assuring increased economy, long life, and minimum cost in repairs. **RECORD.**—Successful and constant use in Great Britain for the past eight years. Address

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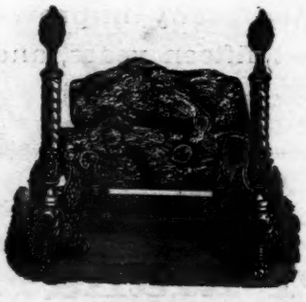
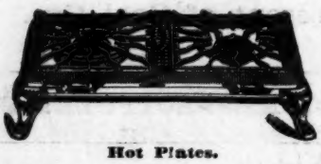


Gas Logs.



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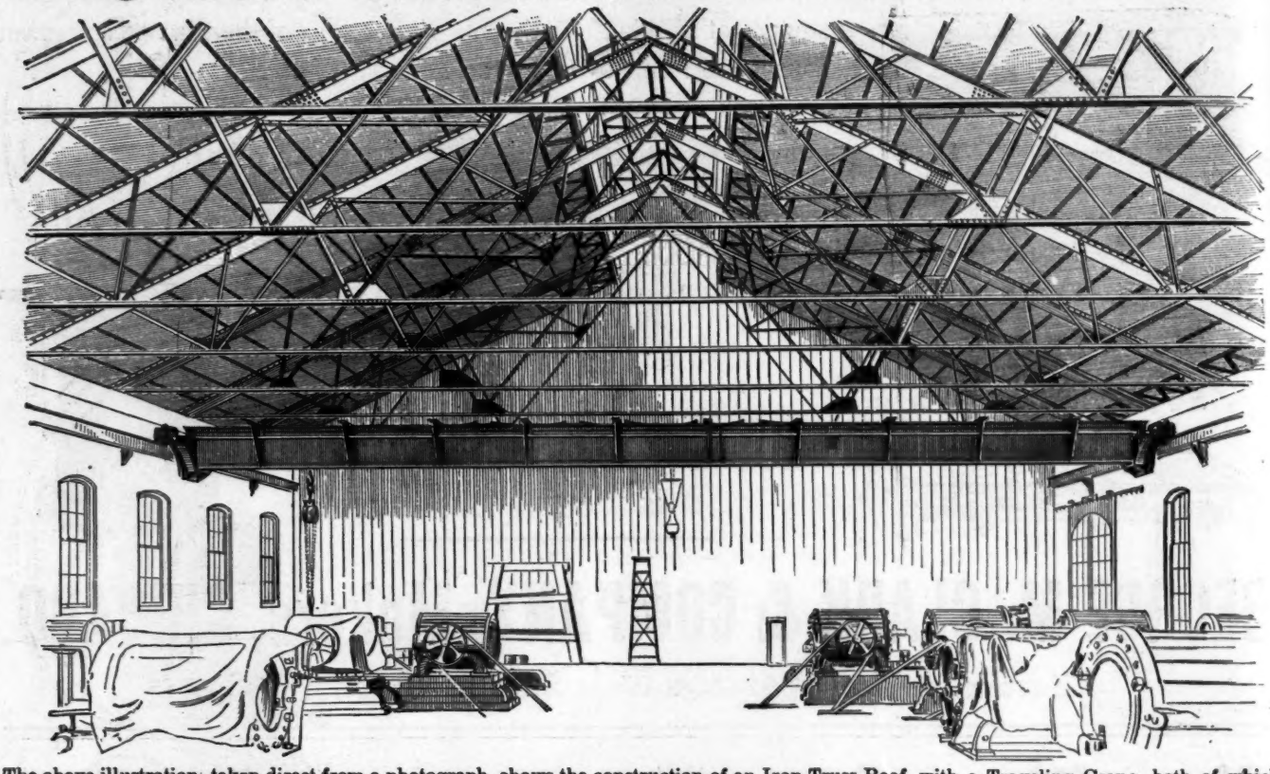

The above illustration, taken direct from a photograph, shows the construction of an Iron Truss Roof, with a Traveling Crane, both of which were designed and built by us for the Narragansett Electric Lighting Company, at Providence, R. I. The illustration is taken in the Dynamo Room, which is 60 feet in width by 200 feet in length. The side walls are of brick, with iron roof trusses covered with our Patent Anti Condensation Corrugated Iron. This is the first roof ever built with this Patent Anti-Condensation Corrugated Iron, and after passing through three severe winters has shown no signs whatever of any dripping or sweating on the Corrugated Iron. We guarantee this Anti-Condensation Iron Roof Covering not to drip in the coldest weather.

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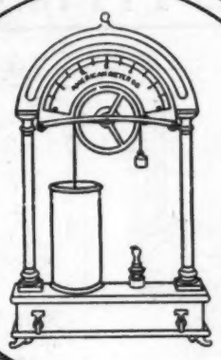
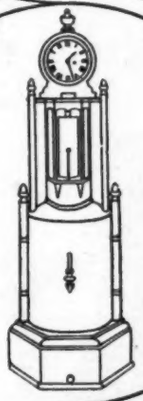
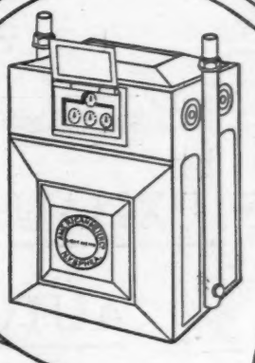


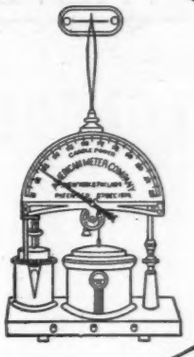


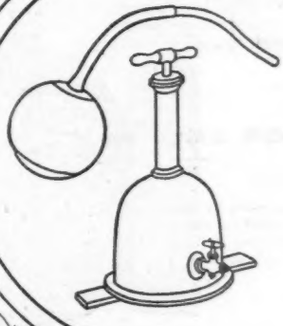
PUBLIC LIGHTING TABLE.

APRIL, 1896.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. Extinguish.
				P.M.	A.M.
Wed.	1	6.50 PM	12.10 AM	6.10	4.55
Thu.	2	6.50	1.20	6.15	4.40
Fri.	3	6.50	2.20	6.15	4.40
Sat.	4	6.50 LQ	3.00	6.15	4.40
Sun.	5	7.00	3.40	6.15	4.40
Mon.	6	7.00	4.10	6.15	4.40
Tue.	7	7.00	4.30	6.15	4.40
Wed	8	7.00	4.30	6.15	4.40
Thu.	9	7.00	4.30	6.25	4.30
Fri.	10	7.00	4.30	6.25	4.30
Sat.	11	7.00	4.30	6.25	4.30
Sun.	12	7.10 NM	4.20	6.25	4 30
Mon.	13	7.10	4.20	6.25	4.30
Tue.	14	7.10	4.20	6.25	4.30
Wed	15	7.10	4.20	6.25	4.30
Thu.	16	7.10	4.20	6.30	4.20
Fri.	17	10.40	4.20	6.30	4.20
Sat.	18	11.30	4.20	6.30	4.20
Sun.	19	12.10 AM	4.10	6.30	4.20
Mon.	20	12.50 FQ	4.10	6.30	4.20
Tue.	21	1.20	4.10	6.30	4.20
Wed.	22	1.50	4.10	6.30	4.20
Thu.	23	2.20	4.10	6.40	4.10
Fri.	24	2.50	4.10	6.40	4.10
Sat.	25	3.10	4.10	6.40	4.10
Sun.	26	No L.	No L.	6.40	4.10
Mon.	27	No L. FM	No L.	6.40	4.10
Tue.	28	No L.	No L.	6.40	4.10
Wed.	29	7.20 PM	11.00 PM	6.40	4.10
Thu.	30	7.20	12.00	6.45	4.00







TOTAL HOURS LIGHTING DURING 1896.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	220.40	January	423.20
February	207.00	February	367.40
March	193.00	March	355.35
April	174.10	April	298.50
May	164.00	May	264.50
June	142.10	June	234.25
July	142.10	July	243.45
August	150.50	August	280.25
September	163.00	September	321.15
October	193.10	October	374.30
November	207.00	November	401.40
December	237.30	December	433.45
Total, yr.	2194.40	Total, yr.	4000.00

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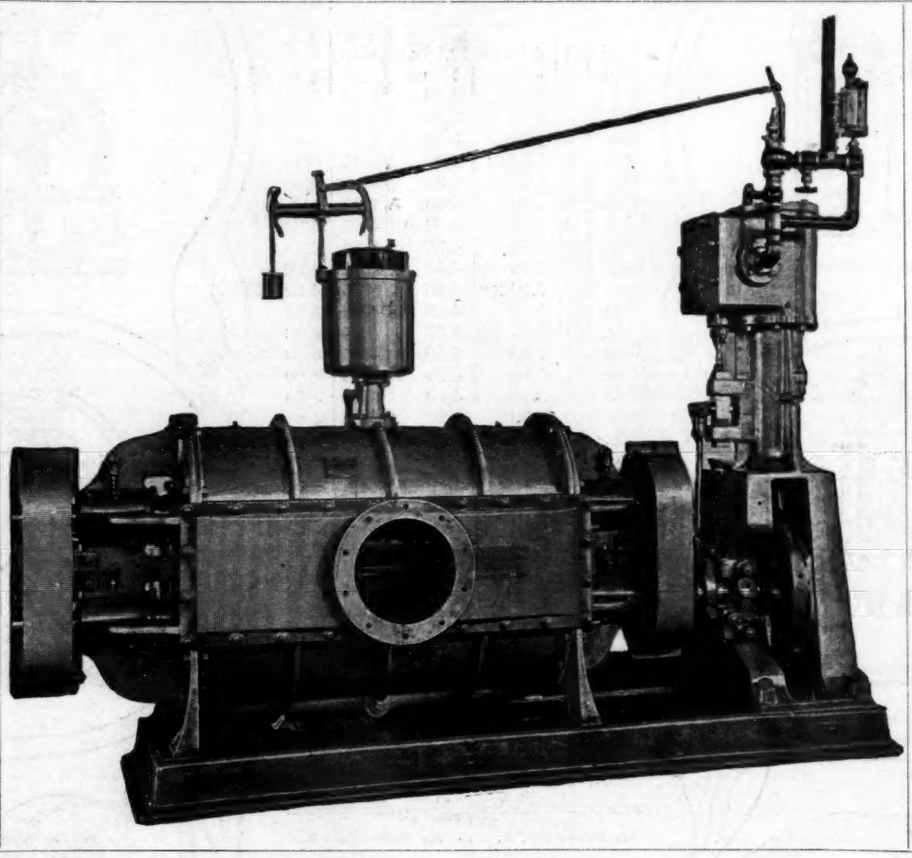

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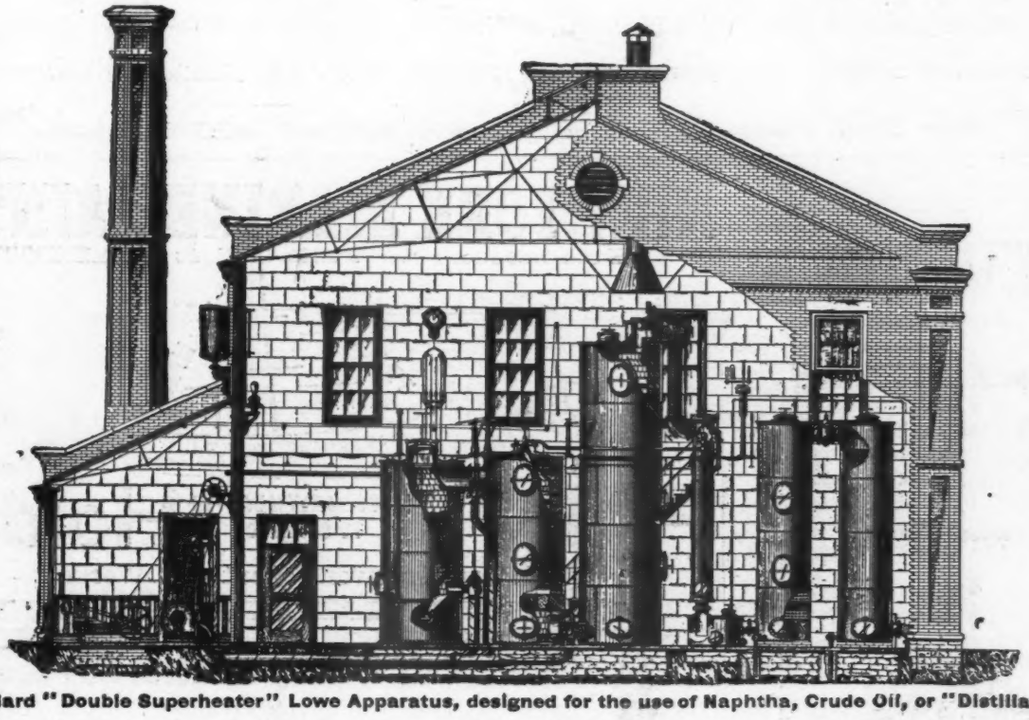

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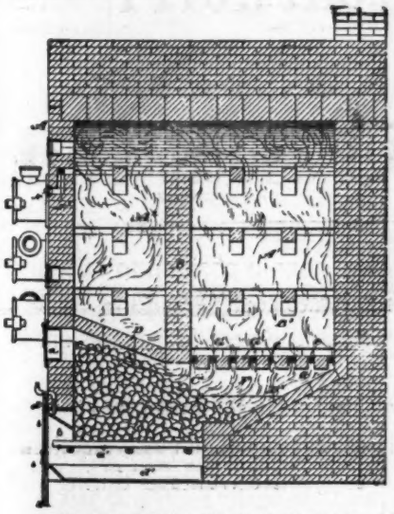

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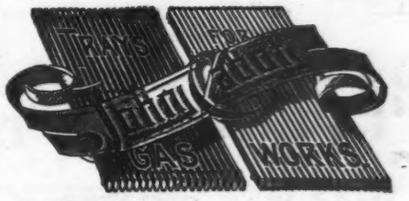

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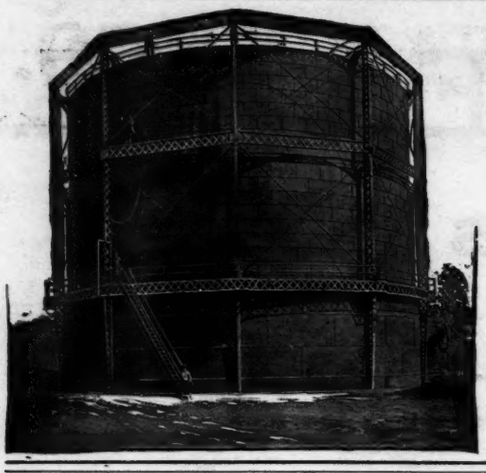

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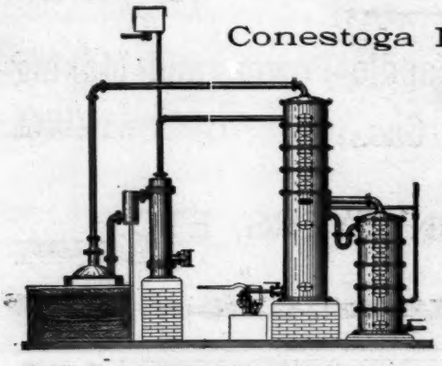

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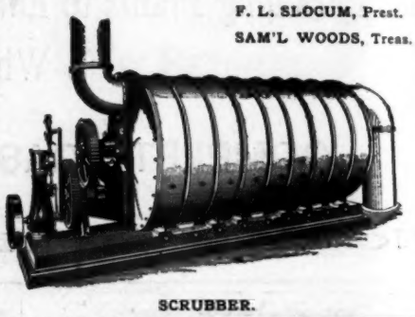

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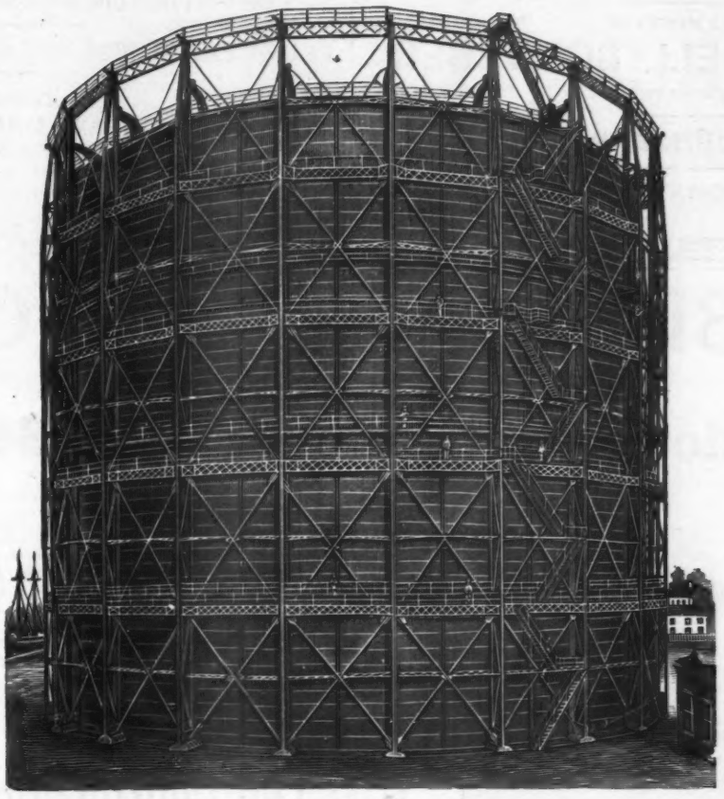

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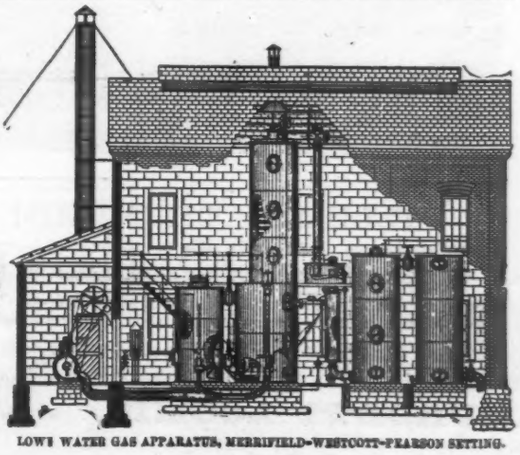

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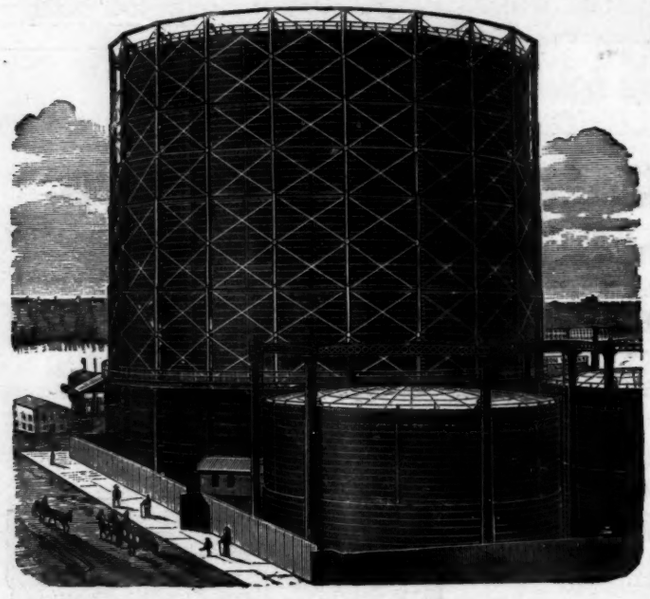

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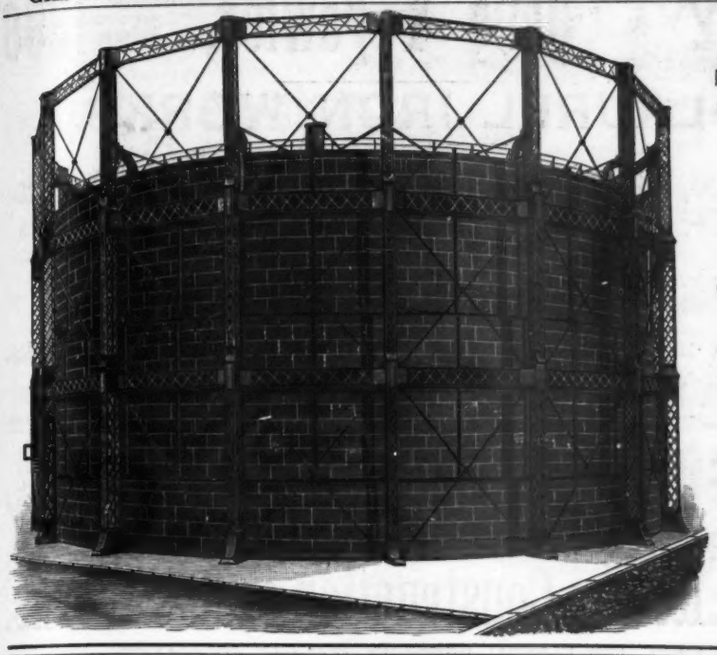

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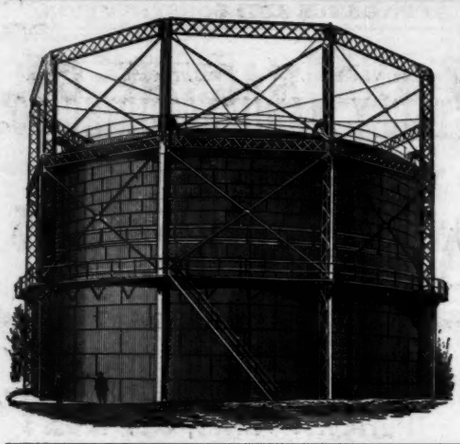

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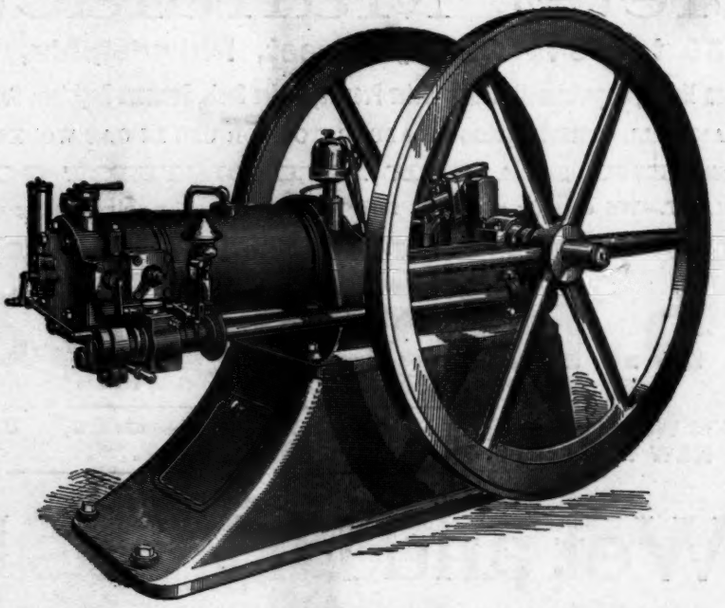

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